



Research Article

Exploring the Link between Corporate Governance Characteristics and Effective Corporate Tax Rate: A Panel Data Approach on U.S. Listed Companies

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Abstract

We blend the corporate governance and corporate taxation literature streams to study the association between board, abreast CEO characteristics, and effective corporate tax rate. We have tried to sweep a broad brush over a large number of different econometric techniques that are relevant to the analysis of financial data. Using a sample of 50 companies, mainly from the technology area, listed at NASDAQ and component of Dow Jones index, over the period 2000-2013, the empirical approach employs panel least squares and quantile regressions, as well as robustness checks by means of estimated generalized least squares, generalized linear model, and generalized method of moments. We find that board independence and board size have a statistically significant negative impact on effective corporate tax rate. It is also important to note that board independence Granger cause corporate taxation. Regardless of its robustness, CEO ownership reveals a mixed influence: positive for quantiles between 0.3-0.5 and negative at the 0.9 quantile. We also find a mixed relationship between CEO tenure and corporate taxation.

Keywords: effective corporate tax rate; corporate governance characteristics; panel data regression models; quantile regression.

Introduction

A special subject of finance is the corporate finance being not only comprehensive in terms of information presented, but also of interest to a broad range of stakeholders in the financial markets: shareholders, managers, investors. In the academic literature about corporate finance, numerous studies are devoted to the development of forecasting techniques for markets evolution, but there are also authors that make reference to corporate governance, an area for which has been granted a growing interest after the crisis of 2007. Besides specific phenomena from the world of finance, the human nature is an important element that leaves its mark (seemingly invisible, but significant) on financial markets. And the better we can support this referring to the notorious studies made by Kahneman and Tversky (1979, 1986). In this paper, we tried to apply a procedure seen in watercolor paintings where was desired to obtain a gradient between two colors, so we applied the 'brush' of the empirical research on both corporate governance and the effective corporate tax rate. The novelty brought consists of an interdisciplinary study, dual, which includes a representation of fiscal management and the board characteristics, focusing on the idea of human nature as an influence factor, and we have highlighted the interdependencies between the two areas, all in the context of corporate finance. Although the literature about these two combined topics is rare, the ultimate goal of this paper seeks to identify whether corporate governance influences the effective corporate tax rate, starting from the premise that earlier studies showed that separate, the two influence the financial performance (see Lee and Swenson, 2012; MacAvoy and Millstein, 1999).

The effective tax rate can be used in financial analysis with duties that transcend the sphere of fiscal management, from researching the lack of protection for minority shareholders to the means of tax avoidance, legal or not, used for the process

of tax optimization. Perhaps even more important than corporate governance, the effective tax rate is a useful tool dedicated to the stakeholders 'trinity' and to the analysis of human relationships within it, translated into financial decisions targeting the company. Another goal is to identify correlations or connections between effective tax rate and corporate governance both in terms of objective point of view and subjective one (human nature) that can be considered as references for future papers on this issue. It is interesting to see if and how the management decisions (CEO, Board of Directors) on reducing the effective rate are influenced by rules imposed by corporate governance, and whether they may affect the company as a whole. Erkens *et al.* (2012) obtained results showing that corporate governance has affected financial performance during the crisis in 2007, meaning that companies with a large number of independent members have urged the shareholders to bring more capital and took fewer risky decisions, but that would had been favorable for company.

The paper proceeds as follows. Section 2 presents the prior literature. The data and empirical setting are provided in Section 3. Empirical results follow in Section 4. The paper concludes in Section 5 with a summary of the findings.

Prior Research

Few authors researched the link between corporate governance and effective corporate tax rate. For the convenience of the reader, we named the effective corporate tax rate with the acronym ECTR. At first glance, the effective tax rate leads to the idea of taxes imposed by the state. However, the ECTR is very important in the context of fiscal management and tax optimization, being a good reflection of managerial decisions for the entire company. The literature on the ECTR is abundant and prolific but stands out the works carried out by Devereux and Griffith (1999) being a landmark for this area. Important contributions were made by

Gupta and Newberry (1997), Richardson and Lanis (2007), along with Nicodème *et al.* (2014) who studied the relationship between ECTR and financial performance for US companies. They have demonstrated empirically that company size, indebtedness, leverage, ROA, ROE, and other financial items are factors which significantly influence the effective tax rate. Because these results are highly debated in the literature, we gave them a greater attention in the empirical research section. In terms of corporate governance, notable studies on the link between financial performance and characteristics of the Board of Directors (independence, size) and the CEO were brought by Yermack (1996), Metrick and Ishii (2002), Bhagat and Bolton (2008)

Studies that explicitly include both elements of corporate governance and ECTR are very few, but some authors have attempted an analysis between the governance and tax avoidance methods, making an indirect link between the two. Sometimes confused with tax aggressiveness, Watson (2011) defined the legal tax avoidance as all means and strategies taken by the company, through the manager and the Board of Directors to reduce the tax burden, in other words, to reduce the effective corporate tax rate. Bauman and Schadewald (2001) showed that shareholders have appreciated the managers who had the ability to reduce the ECTR and have paid them according to the level of tax burden reduction. Armstrong *et al.* (2015) considered that unless paying more attention to agent problems that occur within a company, managers will apply more methods of tax avoidance to reduce the ECTR and to show a positive image to shareholders, but sometimes these methods may have negative effects on company's performance.

Although the tax planning is significant from a financial point of view, a manager should not permit the 'tax' tail wag the financial 'dog'. Hanlon and Heitzman (2010), as well as Gallemore *et al.* (2012) consider companies that use a small level of tax avoidance to reduce ECTR, as marked by dilemma 'under-

sheltering puzzle'. As there is no clear evidence to support that tax avoidance involves direct costs, Gallemore *et al.* (2012) do not understand why some companies do not use this method. On the other hand, a CEO knows that all financial decisions have tax consequences and he should not be afraid to take a decision only from this perspective. Desai and Dharmapala (2006) argue that by reducing tax avoidance, as part of the tax planning, shareholders can control and reduce managerial deviations resulting from the agent's problem. The purpose of tax planning is to identify all the solutions that streamline the company's financial situation by reducing tax obligations. Desai and Dharmapala (2006) suppose that if by reducing the ECTR, using the methods of tax avoidance, the transparency of the company is affected, then there is an increase in the opportunities for CEOs to use the company's financial resources in its own interest, and appears the phenomenon named by literature 'managerial rent extraction'. Also, Desai and Dharmapala (2006) state that this is not possible in companies showing good corporate governance and obtained empirical results that support a negative relation between the CEO's remuneration in the form of equity ('manager's equity incentives') and tax avoidance/reduction of ECTR. Armstrong *et al.* (2015) challenged this idea and considered this type of CEO's remuneration as part of corporate governance mechanism, rewarding being determined by the Board of Directors in order to ease the agent problems. Thus, compensation in the form of equity should be functional in companies with lower corporate governance (small number of independent members, others). Further, Vintilă and Păunescu (2015) provide empirical evidence for large NASDAQ listed companies, components of Dow Jones, showing that compensation as bonuses has a positive relationship with ECTR. Rego and Wilson (2012) acquired empirical evidence that the ECTR reduction through tax avoidance is correlated with high levels of CEO compensation.

Dyreng *et al.* (2010) presented evidence that CEO predisposition towards reducing the effective tax rate by using aggressive tax avoidance is preserved even if they are employed at the same position in another firm. Thus, the ECTR becomes an important milestone when companies and boards of directors, interested in tax planning, analyze managerial skills of a candidate for CEO position. Blaylock (2011) analyzed a large panel of US firms, but was unable to reveal any strong evidence of a link between tax avoidance and rent extraction among poorly governed firms. Consequently, the empirical undertaking failed to support the theory that U.S. companies' managers practice tax avoidance schemes to ease rent extraction from shareholders. Florackis (2008) pointed out that executive ownership lessens discretionary spending, and, thereupon, the agency conflicts between managers and shareholders.

Studying the relationship between effective tax rate and corporate governance, Armstrong *et al.* (2015) proposed the quantile regression (QR) estimation method instead of the consecrated OLS econometric method that is conditioned mean type. The QR estimation follows the relationship between corporate governance and the entire distribution of ECTR because the level of tax avoidance influences the latter. Tax avoidance was seen as a riskier opportunity available to the management. Hence, a bigger Board of Directors and more efficient will realize the benefits of cash flows by reducing the effective tax rate and will want to increase tax avoidance because it does not bear a risk in terms of investment. Awareness of board members is relevant, for they must know when is exceeded the legal and moral limit to reduce the ECTR, because too much use of tax avoidance may have costs that exceed the tax savings achieved through reduced taxation. Armstrong *et al.* (2015) have included the independence and the financial expertise of the members of the Board in analyzing the relationship ECTR/corporate governance, and noted that there is a positive link between

independence, financial expertise, and tax avoidance on the left side of the tax avoidance distribution and a negative relation to the right side. Thus it was shown that a company with several independent members and with developed financial expertise may reduce problems of agent arising with tax avoidance (over/under utilized) used by the CEO to reduce the ECTR in an ineffective governance conditions. Robinson *et al.* (2012) have studied the role of financial development of the company and have shown a positive link between the degree of financial expertise of the audit committee and tax avoidance applied to reduce the ECTR, but found that when companies consider that tax avoidance is risky the link becomes negative.

Minnick and Noga (2010) demonstrated empirically that a Board of Directors that do not show a balance between members (executive and independent) will lead to an increase in the effective tax rate. Florackis (2008) believes that shareholders holding large blocks of shares will benefit from the advantage of reducing the ECTR and will require the manager to fulfill this task but they want to monitor this process. Chen *et al.* (2010) consider that shareholders will be the most affected by the penalties and reputational costs that exist for the use of tax avoidance, the proof of their existence being that not all companies have low levels of ECTR. Ribeiro *et al.* (2015) analyzed the determinants of effective tax rate and included elements of corporate governance. They obtained evidence supporting that insider's holdings of shares known as 'insider ownership', are associated with lower levels of ECTR. Another element identified was the concentration of ownership that for low levels was correlated with a higher ECTR. Ribeiro *et al.* (2015) obtained results showing that companies with a large number of members inside boards of directors had a higher ECTR. The same positive significant relationship was found between the number of independent members and the ECTR.

Florackis (2008) considers that often managers are not interested in reducing the ECTR, which is positive for shareholders' patrimony, because it does not directly fulfill their interests. Therefore, to be incentivized to reduce ECTR and to work out their duties of increasing the shareholders' wealth, managers should be rewarded in company's shares. Through this mechanism of corporate governance, the interests of both parties in the ECTR reduction become the same and thus, it reduces the information asymmetry and agent issues. Badertscher *et al.* (2013) believed that through ownership of shares, the manager would not want to reduce too much the ECTR by any means, because it increases the risk of being affected in both positions they hold in the company. Subscribed to this idea were Fraile and Fradejas (2014) who supported the idea that once the manager will hold shares, he will have a greater power to act in his own interest.

Another element of corporate governance to be analyzed in conjunction with the effective tax rate is the structure of the Board and its characteristics. Studying the empirical relationship between the number of members from the board of directors, and financial performance (ROA, ROE, ROIC, Tobin Q), Vintilă *et al.* (2015) obtained mixed results. Wahab and Holland (2012) consider that these results are due to the experience brought by a large number of members, but also by hindering the adoption of financial decisions of each member. Florackis (2008) considers that a greater number of non-executive members have an important role in

monitoring information asymmetry related to financial decisions. In addition, Vintilă *et al.* (2015) obtained results that support this idea.

Research Design

Sample data

This study examines 50 companies, mainly from the technology area, listed at NASDAQ and component of Dow Jones index, from 2000 to 2013. The sample of issuers is drawn from Thomson Reuters Eikon database. Variable definitions are presented in

Table 1. We use the effective corporate tax rate as outcome variable, together with characteristics of board (independence and size) and CEO (ownership and tenure) as explanatory variables.

Table 1: Definitions of variables used in empirical analysis

Variables	Description
Variables towards taxation (Dependent variable)	
ECTR	Effective corporate tax rate, calculated as Income Tax (Total) / Net income Before Taxes (EBIT).
Variables towards corporate governance characteristics (Independent variables)	
<i>Board characteristics</i>	
BIndep	Board independence, which depicts the share of non-executive directors on the board.
BSize	Board size, which relates to the total number of directors on the board, computed as \ln (The total number of executive directors + Non-executive directors).
<i>CEO characteristics</i>	
CEO_Hold	CEO ownership, which denotes the percentage of company stock held by CEO.
CEO_Tenure	CEO tenure, which shows the length of time that a CEO has been at the helm of the corporation.
Firm-level control variables	
FSize	Firm size, as proxied by total assets (logarithmic values).
ROA	Return on assets ratio, found by dividing net income to total assets, assessing the efficiency of the firm towards using its assets.
Debt/Equity	Debt-to-equity ratio, which reveals a measure of a firm's financial leverage, respectively how much of a company is financed by its debtholders compared with its owners.
Debt/Assets	Debt-to-total assets ratio (also known as Debt ratio), showing the percentage of debt used to finance assets.

Source: Author's own work.

With respect to firm-level variables, we control firm size, performance, and indebtedness. The political cost theory advocates a positive relation between firm size and tax since larger firms register higher degrees of political costs such as public

scrutiny. Instead, the political power theory specifies a negative connection for the reason that larger companies show more political power that can be disposed to handle their tax burden or lobby lawmaking in their benefit. Stickney and McGee (1982) and

Porcano (1986) find a significantly negative link between effective corporate tax rate and firm size, whereas Zimmerman (1983) and Omer *et al.* (1993) revealed a significantly positive relation. Nevertheless, other studies provide evidence for a lack of association (Jacob, 1996; Gupta and Newberry, 1997; Mills *et al.*, 1998).

Concerning financial performance, Noor *et al.* (2010) finds that firms with higher return on assets face lower effective corporate tax rates, whereas Gupta and Newberry (1997) ascertain that ETRs are systematically related to return on assets.

As regards indebtedness, Lasfer (1995) uncovers a weak association between leverage and effective tax rates, concluding

$$ECTR_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

where $ECTR_{it}$ is ECTR for company i in year t , X_{it} is a set of corporate governance characteristics and firm-level controls, ε_{it} is the error term. Primary, we will estimate several panel least squares regressions (both without cross-sectional effects and with cross-section fixed effects). However, 'since traditional OLS and median regression only estimates the relationship at the "center" of the distribution, these techniques cannot detect shifts elsewhere in the distribution of interest' (Armstrong *et al.*, 2015). Consequently, we will employ later on quantile regression technique because it 'is more general and describes changes in both the location and shape of the distribution of interest' (Armstrong *et al.*, 2015). Withal, the robustness of the empirical results will be checked by means of various techniques such as estimated generalized least squares (EGLS), generalized linear model (GLM), and generalized method of moments (GMM).

Furthermore, the Granger (1969) approach is employed in order to examine how much of the current corporate governance characteristics can be explained by past values of them and then to see whether

that companies decide on capital structure to lessen agency costs rather than to benefit from tax deduction. Further, Gupta and Newberry (1997) and Rego and Wilson (2012) establish that firms with high leverage ratios are related with lower effective tax rates harmonious with higher tax avoidance, whereas Wilson (2009) and Lisowsky (2010) proved that tax shelter firms are linked with lower leverage ratios.

Econometric specification

The data set has the structure of a panel data. Each data point in the panel data indicates the i th firm ($i = 1, \dots, 50$) at the t th period ($t = 2000, \dots, 2013$). The basic equation model used to explore the link between corporate governance characteristics and effective corporate tax rate is depicted below:

adding lagged values of ECTR can improve the explanation. Corporate governance characteristics are said to be Granger-caused by ECTR if ECTR helps in the prediction of corporate governance characteristics or if the coefficients on the lagged corporate governance characteristics are statistically significant.

Empirical Results

Summary statistics

The descriptive statistics of the variables are presented in

Table 2. The mean (median) ECTR for our sample is 28.015% (29.30%). As regards board independence, we acknowledge the

lack of balance between executive and nonexecutive directors.

Table 2: Descriptive statistics

	N	Mean	Std. Dev.	Min.	Lower Quartile	Median	Upper Quartile	Max.
ECTR	70	0.28015	0.10948	0.00000	0.22720	0.29300	0.34900	0.82500
BIndep	70	0.12992	0.21675	0.00000	0.00000	0.00000	0.32258	0.66667
BSize	70	2.84301	0.37779	1.94591	2.48491	2.89037	3.13549	3.66356
CEO Hold	70	0.07099	0.29439	0.00000	0.00000	0.00000	0.02000	6.67000
CEO_Tenur	70	2.28571	4.63408	0.00000	0.00000	0.00000	2.00000	26.0000
FSize	70	14.9968	4.12562	4.17592	12.8043	16.6818	18.2029	20.4973
ROA	70	0.09940	0.06868	0.00086	0.05400	0.08777	0.13528	0.65420
Debt/Equit	70	0.73884	1.04305	0.00000	0.05500	0.34500	0.91500	6.62308
Debt/Asset	70	0.45160	0.23805	0.00000	0.27316	0.45928	0.60044	1.21000

Source: Author's computations. For variable description, see

Table 1.

The selected firms are profitable since the reported mean (median) ROA is 9.940% (8.777%). However, the companies from our sample are highly levered with a mean (median) Debt/Equity ratio of 73.884% (34.50%).

Table 3 contains the correlations between the variables. With the exception of the strong uphill (positive) linear relationship between BSize and FSize (0.719553), all of them show low correlation coefficients, so that multicollinearity should not be a concern.

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ECTR (1)	1 -----								
BIndep (2)	-0.16923 (-4.53647)	1 -----							
BSize (3)	-0.01559 (-0.41187)	0.032376 (0.85581)	1 -----						
CEO_Hold (4)	-0.04835 (-1.27893)	0.133598 (3.561537)	-0.17471 (-4.68785)	1 -----					
CEO_Tenure (5)	-0.07464 (-1.97754)	0.315052 (8.770205)	-0.20716 (-5.59442)	0.273982 (7.526535)	1 -----				
FSize (6)	0.039469 (1.043576)	0.074635 (1.977352)	0.719553 (27.37523)	-0.22971 (-6.23564)	-0.22315 (-6.04815)	1 -----			
ROA (7)	0.011971 (0.316303)	-0.03852 (-1.01856)	0.029517 (0.780162)	-0.07067 (-1.87179)	-0.19029 (-5.12106)	0.047459 (1.255271)	1 -----		
Debt/Equity (8)	-0.14022 (-3.7415)	0.060176 (1.59272)	0.135233 (3.605948)	0.043218 (1.142886)	0.158724 (4.247294)	0.14062 (3.752424)	-0.10782 (-2.67537)	1 -----	
Debt/Assets (9)	0.013419 (0.354562)	0.035585 (0.940736)	0.528357 (16.44128)	-0.12311 (-3.27746)	-0.07473 (-1.97983)	0.566001 (18.13863)	-0.12512 (-3.22173)	0.493554 (14.99289)	1 -----

Source: Author's computations. Notes: Figures in parenthesis are t-statistics. For variable description, see

Table 1.

Regression Results

Table 4 provides the estimates of panel least squares regressions (without cross-sectional effects). We test the influence of board and CEO characteristics on ECTR, both separately and all once. Therefore, board independence

(Eq 1, Eq5, and Eq 7) and board size (Eq 2, Eq 5, and Eq 7) negatively influence ECTR, but the explanatory power of the estimated models is reduced (a mean value of 4.32% related to R-sq). On the contrary, the relationships between CEO ownership and ECTR (Eq 3, Eq6, and Eq 7), as well as CEO tenure and ECTR (Eq 4, Eq6, and Eq 7), are not statistically significant.

Table 4: Panel least squares regressions of ECTR on corporate governance characteristics and firm-level controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	0.276315*** (17.5579)	0.32893*** (17.43686)	0.273189*** (16.15389)	0.276032*** (17.36671)	0.338611*** (18.729)	0.277754*** (17.34884)	0.335856*** (16.80959)
BIndep	- 0.082644***				- 0.083604***		-0.08602*** (-)
BSize		- 0.031723***			- 0.033429***		- 0.033012***
CEO_Hold			-0.010012 (-0.742229)			-0.007355 (-0.567168)	-0.001964 (-0.158066)
CEO_Tenure				-0.000906 (-1.419475)		-0.000802 (-1.103283)	0.000415 (0.615309)
FSize	0.000628 (0.669348)	0.001937 (1.620637)	0.0000356 (0.038023)	-0.0000141 (-0.015404)	0.002482* (2.165157)	-0.0000995 (-0.109937)	0.002533* (2.314418)
ROA	-0.00494 (-0.088551)	0.010267 (0.172738)	0.003918 (0.065381)	-0.003959 (-0.066985)	-0.001015 (-0.018179)	-0.004602 (-0.0778)	0.002866 (0.051643)
Debt/Equity	- 0.018975***	- 0.020839***	- 0.019948***	- 0.019363***	- 0.019613***	- 0.019262***	- 0.019907***
Debt/Assets	0.043546* (2.02845)	0.059208** (2.719639)	0.047578* (2.175863)	0.046721* (2.142467)	0.054945* (2.53306)	0.046348* (2.118151)	0.055254* (2.545406)
F-value	8.109597***	4.919170***	4.207084***	4.298789***	7.541412***	3.620056**	5.663154***
Pr > F	0.000000	0.000197	0.000896	0.000738	0.000000	0.001523	0.000001
R-sq	0.055201	0.034228	0.029419	0.030041	0.061292	0.030390	0.061531
Adj R-sq	0.048394	0.027270	0.022426	0.023053	0.053164	0.021995	0.050665

Source: Author's computations. Notes: ***, **, *, † refer to 0.1%, 1%, 5%, and 10% levels of significance, respectively. Figures in parenthesis are t-statistics. Sample: 2000-2013. Periods included: 14. Cross-sections

included: 50. Total panel (balanced) observations: 700. White cross-section standard errors & covariance (d.f. corrected). For variable description, see

Table 1.

Further, the estimates with fixed effects are shown in Table 5. The negative influence of board independence on ECTR is reinforced (Eq 1, Eq5, and Eq 7), but the relationship between board size and ECTR gets out of sight. Nevertheless, we find a negative influence of CEO tenure on ECTR (Eq 4 and Eq 6). This fact is related to the experience of the CEO about tax system, accumulated over the years.

Table 5: Panel least squares regressions (cross-section fixed) of ECTR on corporate governance characteristics and firm-level controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
C	0.532273*** (7.063226)	0.664575*** (6.227291)	0.721499*** (8.522007)	0.621508*** (6.129386)	0.452725*** (4.337569)	0.617492*** (6.044013)	0.428265*** (3.501418)
BIndep	- 0.064604***				- 0.065754***		- 0.058818***
BSize		0.029458 (0.95492)			0.03463 (1.121663)		0.036593 (1.160557)
CEO_Hold			-0.008457 (-1.34537)			-0.006412 (-1.168939)	-0.004468 (-0.771845)
CEO_Tenure				-0.003941* (-)		-0.003873* (-)	-0.001361 (-0.811394)
FSize	-0.01491** (-)	- 0.029949***	-0.02792*** (-)	- 0.020582**	- 0.016395***	- 0.020295**	- 0.014928**
ROA	0.022793 (0.269671)	0.038373 (0.399546)	0.024084 (0.257743)	0.01015 (0.112225)	0.040664 (0.462)	0.011073 (0.122965)	0.037711 (0.432613)
Debt/Equity	-0.005272 (-0.530412)	-0.003393 (-0.352831)	-0.004907 (-0.527184)	-0.003945 (-0.409146)	-0.003485 (-0.342969)	-0.003953 (-0.408995)	-0.003003 (-0.293354)

Debt/Assets	-0.040975 (-1.635877)	-0.045032[†] (-)	-0.046069[†] (-)	-0.048219[†] (-)	-0.040026 (-1.534826)	-0.048406[†] (-1.94682)	-0.041498 (-1.625684)
F-value	9.174769^{***}	8.806047^{***}	8.784865^{***}	8.919158^{***}	9.042934^{***}	8.751169^{***}	8.716017^{***}
Pr > F	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
R-sq	0.434428	0.424378	0.423790	0.427498	0.435762	0.427715	0.436255
Adj R-sq	0.387077	0.376186	0.375549	0.379568	0.387573	0.378840	0.386203

Source: Author's computations. Notes: ***, **, *, † refer to 0.1%, 1%, 5%, and 10% levels of significance, respectively. Figures in parenthesis are t-statistics. Sample: 2000-2013. Periods included: 14. Cross-sections included: 50. Total panel (balanced) observations: 700. White cross-section standard errors & covariance (d.f. corrected). For variable description, see

Table 1.

By extending the empirical research by means of quantile regressions (see *Table 6*), the results confirm the negative influence of *Bindep* on *ECTR* (all the estimated equations). Likewise, *Bsize* reveals a negative influence on *ECTR* (Eq 4 - Eq 8), but for quantiles over 0.3. Onward, we establish mixed associations between *CEO_Hold* and *ECTR*: positive (for quantiles between 0.3

and 0.5) and negative (at the 0.9 quantile or the 90th percentile). *CEO_Tenure* positively influences *ECTR* for upper quantiles (0.8 and 0.9). All these results can be attributed to the fact that executive and independent members from the boards and CEO, all of them have different views, opinions and interests regarding the level of *ECTR*, as we mentioned in Section 2.

Table 6: Quantile regressions of ECTR on corporate governance characteristics and firm-level controls

	(1) (tau = 0.1)	(2) (tau = 0.2)	(3) (tau = 0.3)	(4) (tau = 0.4)	(5) (Median)	(6) (tau = 0.6)	(7) (tau = 0.7)	(8) (tau = 0.8)	(9) (tau = 0.9)
C	0.066528 (0.375935)	0.275689 ^{***} (3.647612)	0.28151 ^{***} (6.155653)	0.351005 ^{***} (9.119786)	0.401985 ^{***} (11.68985)	0.405778 ^{***} (11.85843)	0.433383 ^{***} (15.56895)	0.44391 ^{***} (17.07632)	0.449031 ^{***} (14.66927)
BIndep	-0.073812 [†] (-1.666869)	-0.091075 ^{***} (-3.429082)	-0.09593 ^{***} (-4.109642)	-0.114081 ^{***} (-5.384732)	-0.100812 ^{***} (-4.18715)	-0.081146 ^{**} (-3.11463)	-0.058332 ^{**} (-2.928936)	-0.057615 ^{**} (-3.311064)	-0.053964 ^{**} (-2.948644)
BSize	-0.007134 (-0.101425)	-0.037581 (-1.483273)	-0.028911 (-1.506236)	-0.047476 ^{**} (-2.706478)	-0.057304 ^{***} (-3.553233)	-0.029313 [*] (-2.074104)	-0.028798 [*] (-2.389044)	-0.024133 [*] (-1.985662)	-0.016617 (-1.035127)
CEO_Hold	0.008896 (0.070385)	-0.096234 (-0.581961)	0.017537 ^{***} (3.963932)	0.015013 ^{**} (2.912447)	0.010373 [†] (1.902574)	0.005493 (0.991757)	-0.000399 (-0.080586)	-0.003924 (-0.971794)	-0.008204 ^{**} (-2.632252)
CEO_Tenure	-0.004395 (-1.540072)	-0.002735 (-0.638613)	-0.002045 (-0.921798)	0.000449 (0.213169)	0.001768 (1.359415)	0.001447 (1.204848)	0.001069 (1.22411)	0.001554 [*] (2.039934)	0.002026 [*] (2.289913)
FSize	0.003516 (0.556626)	0.001094 (0.357521)	0.000626 (0.347368)	0.001195 (0.680176)	0.001794 (0.877518)	-0.001408 (-0.739452)	-0.0000884 (-0.054747)	0.000096 (0.064242)	0.000214 (0.143924)
ROA	0.284574 ^{***} (4.717771)	0.121313 [†] (1.695604)	0.154299 ^{***} (3.9376)	0.093797 [*] (2.299847)	0.046076 (1.036337)	0.008837 (0.186501)	-0.069506 (-1.505615)	-0.069716 [†] (-1.799627)	-0.086888 [*] (-2.42992)
Debt/Equity	-0.027251 [*] (-2.482934)	-0.025674 ^{***} (-4.80912)	-0.02175 ^{***} (-4.496545)	-0.024191 ^{***} (-5.379534)	-0.024798 ^{***} (-4.738151)	-0.023522 ^{***} (-3.404866)	-0.016075 ^{***} (-3.386182)	-0.017241 ^{***} (-4.322949)	-0.023207 ^{***} (-7.230052)
Debt/Assets	0.125166 [*] (2.524784)	0.126668 ^{**} (3.287706)	0.109733 ^{***} (3.989836)	0.118305 ^{***} (4.864765)	0.100253 ^{***} (3.520345)	0.079697 [*] (2.101797)	0.027051 (0.900147)	0.011851 (0.447197)	0.015766 (0.684225)
Pseudo R-sq	0.066178	0.066030	0.064088	0.054352	0.045637	0.043422	0.049494	0.054637	0.064143
Adj R-sq	0.055367	0.055217	0.053253	0.043404	0.034588	0.032348	0.038489	0.043692	0.053308

Source: Author's computations. Notes: ***, **, *, † refer to 0.1%, 1%, 5%, and 10% levels of significance, respectively. Figures in parenthesis are t-statistics. Sample: 2000-2013. Included observations: 700. Huber Sandwich Standard Errors & Covariance. Sparsity method: Kernel (Epanechnikov) using residuals. For variable description, see

Table 1.

By employing robustness checks via panel EGLS, GLM, and panel GMM (see *Table 7*), the negative influence of board independence (all the estimated models) and board size (Eq 2) is strengthened. However, the lack of influence related to CEO_Hold is emphasized. In addition, the influence of CEO_Tenure is mixed: positive (Eq 1) and negative (Eq 3 and

Eq 4). Contrary to Gupta and Newberry (1997) results, ROA had a negative sign for GMM estimation method. This fact shows that managers can use the financial performance to reduce ECTR, as a political power and in the interest of the company and shareholders.

Table 7: Robustness checks

	(1) Panel EGLS	(2) GLM	(3) Panel GMM	(4) Panel GMM
C	0.650137^{***} (10.09393)	0.335856^{***} (9.682227)		
ECTR (-1)			0.051334^{***} (5.559802)	0.098748^{***} (4.519264)
ECTR (-2)			-0.081641^{***} (-10.11675)	-0.061411[†] (-1.903375)
ECTR (-3)				0.00309 (0.432081)
BIndep	-0.038386^{***} (-5.7482)	-0.08602^{***} (-4.313684)	-0.014986^{***} (-3.67599)	-0.021736^{**} (-2.790915)
BSize	-0.011604 (-0.71747)	-0.033012[*] (-2.086933)	-0.025857 (-0.491113)	-0.022595 (-0.202436)
CEO_Hold	-0.00067 (-0.619909)	-0.001964 (-0.134949)	-0.028311 (-1.227271)	0.009345 (0.14737)
CEO_Tenure	0.001557[†] (1.686683)	0.000415 (0.414804)	-0.00977^{***} (-5.003908)	-0.009972^{***} (-4.859088)
FSize	-0.021461^{***} (-7.705145)	0.002533[†] (1.655766)	-0.000755 (-0.126371)	0.01567 (0.58471)
ROA	0.023917 (1.185321)	0.002866 (0.04711)	-0.198435^{***} (-7.162111)	-0.129719 (-1.546311)
Debt/Equity	-0.012953[†] (-1.868962)	-0.019907^{***} (-4.299573)	-0.012865[*] (-2.042611)	-0.011565 (-1.437264)
Debt/Assets	-0.014362 (-0.712326)	0.055254[*] (2.230963)	-0.039639 (-1.242088)	-0.026874 (-0.847926)
F-value	24.47646^{***}			
Pr > F	0.000000			
R-sq	0.684855			
Adj R-sq	0.656875			
J-stat			41.99032	40.14358

Source: Author's computations. Notes: ^{***}, ^{**}, ^{*}, [†] refer to 0.1%, 1%, 5%, and 10% levels of significance, respectively. Figures in parenthesis are t-statistics. Sample: 2000-2013. For variable description, see

Table 1.

Table 8 reports the output of Granger causality examination. We find, only for the first lag, that board independence Granger causes ECTR, even if the reverse causality is

not valid. This fact is associated with the reluctance of the independent members about tax avoidance.

Table 8: Pair wise Granger Causality Tests

Null Hypothesis	Lag 1		Lag 2		Lag 3	
	Obs	F-Statistic (Prob.)	Obs	F-Statistic (Prob.)	Obs	F-Statistic (Prob.)
BINDEP does not Granger Cause ECTR	650	5.04025 (0.0251)	600	1.67727 (0.1878)	550	1.11813 (0.3411)
ECTR does not Granger Cause BINDEP		0.23711 (0.6265)		2.28122 (0.1031)		1.51312 (0.2101)
BSIZE does not Granger Cause ECTR	650	0.86071 (0.3539)	600	0.21603 (0.8058)	550	0.30959 (0.8185)
ECTR does not Granger Cause BSIZE		0.31656 (0.5739)		0.39977 (0.6707)		0.88870 (0.4467)
CEO_HOLD does not Granger Cause ECTR	650	0.08060 (0.7766)	600	0.00947 (0.9906)	550	0.19101 (0.9025)
ECTR does not Granger Cause CEO_HOLD		0.11494 (0.7347)		0.13314 (0.8754)		0.11233 (0.9529)
CEO_TENURE does not Granger Cause ECTR	650	0.22018 (0.6391)	600	1.70847 (0.1820)	550	1.29218 (0.2763)
ECTR does not Granger Cause CEO_TENURE		6.67516 (0.0100)		0.86698 (0.4207)		0.65974 (0.5771)

Source: Author's computations. For variable description, see

Table 1.

In addition, for the first lag, ECTR Granger causes CEO tenure. Economically, this can be explained by the fact that only the experienced CEOs can juggle it with the tax system breaches and regulation, so that, taxation's harshness has an influence when a company employs a CEO, according to his tenure. For the rest of variables and lags, the causality relationships are not statistically significant.

Concluding Remarks

This paper examines the link between corporate governance characteristics and effective corporate tax rate. We extend the empirical research by estimating panel least squares regressions and quantile regressions. From the perspective of board characteristics, the results provide support for a negative influence of board independence on effective corporate tax rate opposite Ribeiro *et al.* (2015), but similar to Armstrong *et al.* (2015) for high levels of tax avoidance. Also, we ascertain a negative influence of board size on effective corporate tax rate contrary to Ribeiro *et al.* (2015), due to issues related to communication and coordination. As regards CEO characteristics, we find mixed results between CEO ownership and corporate taxation by means of quantile regression. Also, CEO tenure documents opposed results, namely negative influence when estimating panel least

squares regressions (cross-section fixed) and positive for upper quantiles regressions. The robustness checks confirm the negative influence of board characteristics on effective corporate tax rate and support the mixed influence of CEO tenure. Likewise, the Granger (1969) approach emphasizes that board independence Granger causes corporate taxation. All these findings can be explained by the influence of informational asymmetry and agency problems, but the true puppeteer behind the scene is the human nature which acts in the benefit of its owner: managers, directors, board members and shareholders.

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