Master’s Thesis of Kwanpyo Ko

How Does Tax Administration Efficiency Affect Effectiveness of Tax Collections?

– Using ICT Expenditure Share as a Proxy Variable –

조세 행정의 효율성이 조세 징수의 유효성에 미친 영향

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Abstract

This paper empirically analyzes how tax administration efficiency affects the effectiveness of tax collections. In order to identify the effect of tax administration efficiency, many previous papers have used socio-demographic variables such as population density, urbanization, and education level as proxy variables. These variables have limitations because their channels on tax structure are unclear, and the government today utilizes ICT in the tax administration systems. I, instead, suggest ICT expenditure share from *OECD Tax Administration* as an alternative because how well the government utilizes ICT in tax administration is a critical factor in determining efficiency. I use a panel dataset of 50 countries ranging from 2007 to 2020, and I adopt a fixed effects model and a dynamic panel model with a two-step system GMM. The results show that ICT expenditure share affects direct taxation positively, especially for personal income tax. Social security contributions show negative signs, and no significant effect is shown on indirect taxation, including VAT & Sales taxes, and trade tax. These results provide evidence that the government relies more on direct taxation as its tax administration system becomes more efficient.

Keyword : Tax Administration Efficiency, Tax Collection, Tax Structure, ICT Expenditure Share

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Chapter 1. Introduction

Implementing an efficient tax administration system is a high priority for tax authorities. More efficient tax administration enables taxpayers' compliance costs and tax authorities' administrative costs to decrease, which leads the authorities to achieve their policy objectives and raise tax revenue. This process could be reflected in the tax collection and eventually in tax structure change, which implies the government relies its budget on different tax sources. In this paper, I empirically analyze how tax administration efficiency affects the effectiveness of tax collection. Many empirical papers have focused on this question. They have used socio-demographic variables such as population density, urbanization, and education level as proxy variables to identify the effect of tax administration efficiency following Kau and Rubin (1981), Ansari (1982), and Reizman and Slemrod (1987). These variables, however, have two fundamental limitations. First, in the absence of any systematic study, it is unclear how these variables would matter in the process of levying and collecting taxes. Furthermore, these variables are inappropriate for the tax administration system today, where the government utilizes information & communication technology (ICT) in the overall process of tax policy implementation. For these reasons, the variables cannot appropriately identify the targeting effect.

I suggest an ICT expenditure share from *OECD Tax Administration* as an alternative proxy variable to capture tax administration efficiency. This variable shows how much ICT expenditure takes up from a tax authority's total operating expenditure. Expenditure on ICT solutions is one example, which allows the tax authority to establish systems for registration, return processing, payment processing, and auditing. I analyze how ICT expenditure share affects countries' tax collection using a fixed effects model and a dynamic panel model with a two-step system Generalized Methods of Moment (GMM). The panel dataset consists of 50 countries from 2007 to 2020. The results show that ICT expenditure share affects direct taxation positively, especially for personal income tax, but no significant effect is found in indirect taxation. These results provide evidence that as tax administration becomes more efficient, the government can depend on its budget more on direct taxes. I find no evidence that more efficient tax administration results in less indirect taxation.

The remainder of the paper is organized as follows. Chapter 2 explores related literature for the research. Chapter 3 describes the data and empirical findings. Chapter 4 explains the empirical models. Chapter 5 verifies the results and interprets them. Chapter 6 concludes.

Chapter 2. Literature Review

This chapter explains how the previous empirical papers have investigated the relationship between tax administration efficiency and tax collection. Due to data availability, many previous papers have used socio-demographic variables such as population density, urbanization, and education level to identify the effect of tax administration efficiency. (Kenny and Winer (2006), Mahdavi (2008), Martinez-Vazquez *et al.* (2009), Rodríguez (2018), Garcia and Haldenwang (2016), Dioda (2012)). To the best of my knowledge, this fashion dates back to Kau and Rubin (1981), Ansari (1982), and Reizman and Slemrod (1987). However, the variables' effects on the tax structure are ambiguous for the following reasons.

For urbanization, which is defined as the population ratio in urban areas, Kau and Rubin (1981) argues that when people are closely located, the tax authority's monitoring process becomes less expensive. They, however, indicate that increasing the neighbors' closeness makes informal transactions more feasible and thus reduces tax revenues, which is the point also commented by Martinez-Vazquez *et al.* (2009).

Population density is defined as the population per square kilometer. In a similar logic to urbanization, Ansari (1982) and Reizman and Slemrod (1987) hypothesize that a high concentration of population is positively related to tax compliance because income or sales taxes are more difficult to administer in sparsely populated areas. In contrast, Kenny and Winer (2006) points out that, along with urbanization, population density could affect tax bases such as land property.

Reizman and Slemrod (1987) suggests literacy rate because while a tariff system requires a small number of educated people, income or sales taxation requires the participation of a large number of educated people so that the tax collection function effectively. On the other hand, Rodríguez (2018) argues that higher education levels are related positively to tax morale; thus education might boost tax revenue. As we can see, no unified opinions exist in previous studies, and the channels of variables are unclear.

Chapter 3. Data Description and Empirical Findings

Efficiency gains in the tax administration systems can take various forms; how well the administrative organizations design their internal structures; how well they allocate budgeted funds to meet their priorities; and how the relevant laws are improved. Among these forms, how well the government utilizes ICT in tax administration has recently become important. Traditional ICT system underpins the administrative tasks of processing returns, payments, and collecting information through third parties. In addition, the modern ICT systems include support for electronic registration, filing, and payment, and also information dissemination via cross-agency governmental databases.[①] These innovations allow the government to reduce administrative cost for performing tax policies and the taxpayers' tax evasion.[②] From this perspective, considering how much the government weights importance to ICT expenditure would be a critical factor in determining the tax system's efficiency. Among the available data, it seems that ICT expenditure share is appropriate data to be used as a proxy variable to capture tax administration efficiency and conduct an international comparison.

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① Jimenez *et al.* (2013)

② Alm (2021) argues that the innovation in tax administration driven by digitalization will make tax evasion difficult for most taxpayers. The innovations include the increasing use of or growth in electronic cash or commerce, blockchain technology, P2P networks, and big data. These innovations improve the ability of the government to track transactions, retrieve information, and monitor workers.

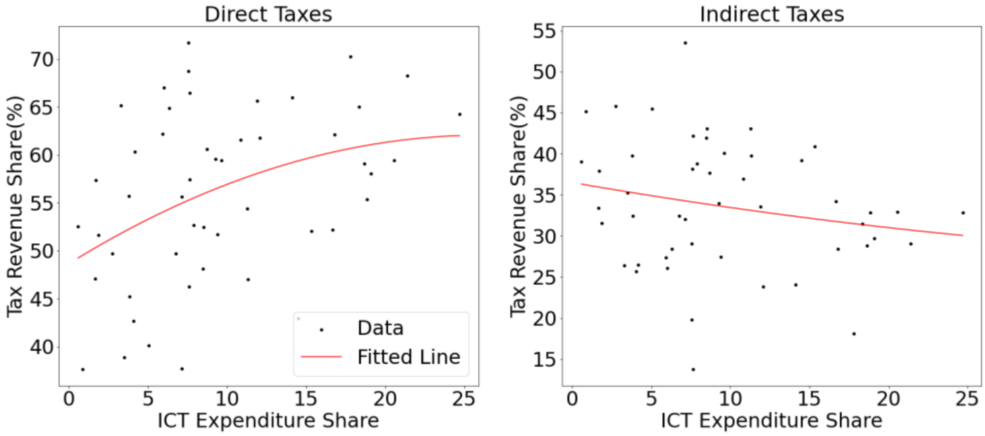

Figure 1. Tax Revenue Share and ICT Expenditure Share

Notes: Each point refers to a country's tax revenue share and ICT expenditure share averaged over the whole period. The red line denotes a second-order regression fitted to the data. I use a panel dataset of 50 countries ranging from 2007 to 2020. Direct taxes include personal income tax, corporate income tax, and social security contributions. Indirect taxes include consumption tax (including VAT), and trade tax.

In this chapter, I provide an overview of the relationship between each source of tax structure and ICT expenditure share. Figure 1 plots the relationship between tax structure and ICT expenditure share. I classify the tax structure into direct and indirect taxes. Each point in the graphs refers to a country's tax revenue share and ICT expenditure share averaged over the whole period. The red line denotes a second-order regression fitted to the data. I use a panel dataset of 50 countries ranging from 2007 to 2020. Tax structure data and ICT expenditure share are gathered from *OECD Statistics*. Direct taxes include personal income tax, corporate income tax, and social security contributions. [③] Indirect taxes consist of consumption taxes (including value-added tax (VAT)), and trade tax. [④] The

[③] I do not include property tax in direct taxes. Property tax consists of taxes that can be potentially categorized into indirect taxes, such as taxes on financial and capital transactions. Martinez-Vazquez *et al.* (2009) also points out that property taxes on commercial buildings and motor vehicles can be considered indirect taxes. Excluding property tax from direct taxes, however, does not influence the graph's overall upward trend.
[④] I provide a specific code description for each tax source in Appendix A.

figure shows

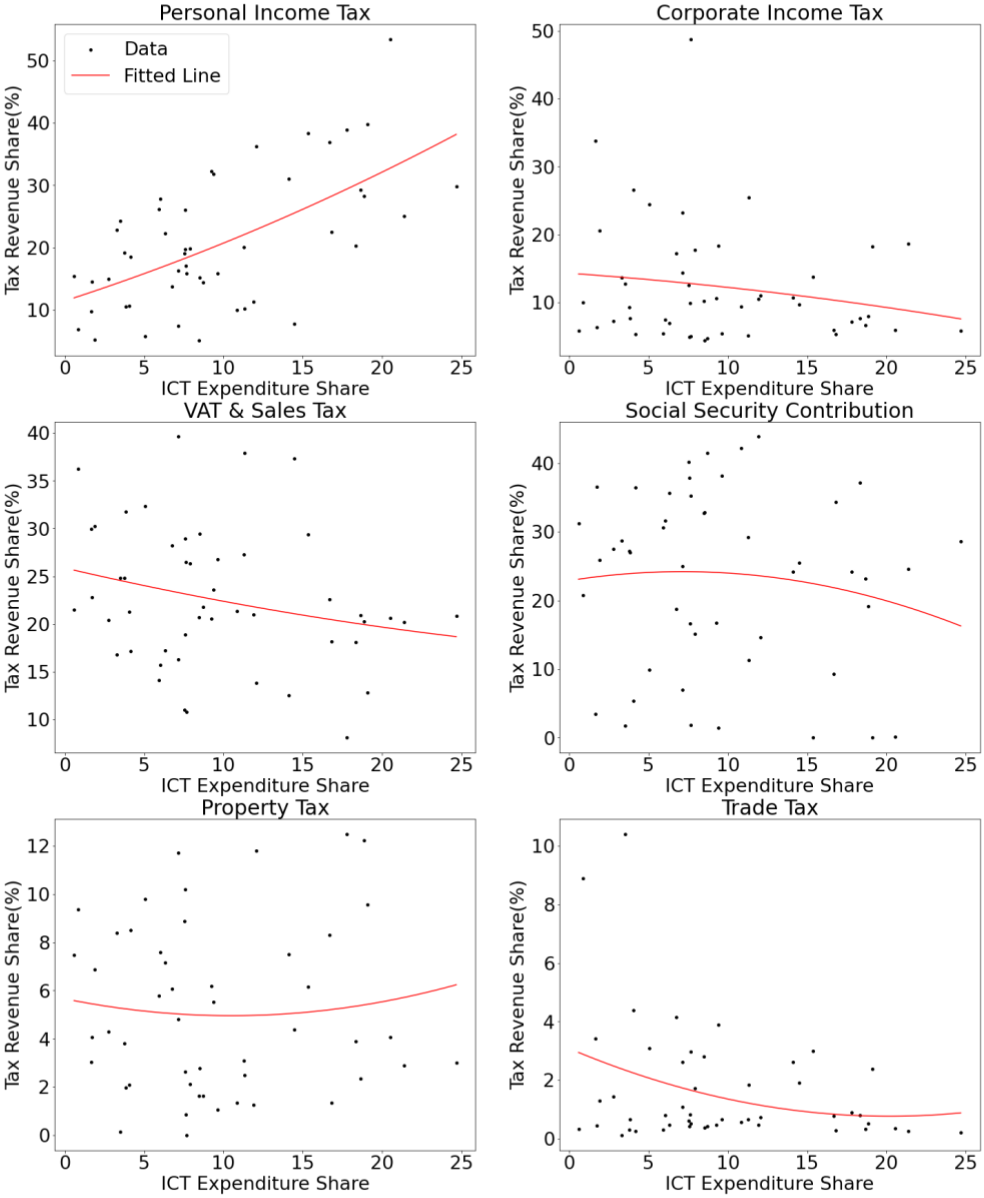

Figure 2. Tax Revenue Share and ICT Expenditure Share

Notes: Each point refers to a country's tax revenue share and ICT expenditure share averaged over the whole period. The red line denotes a second-order regression fitted to the data. I use a panel dataset of 50 countries ranging from 2007 to 2020.

that while ICT expenditure share is positively associated with direct taxes, it is negatively associated with indirect taxes. These empirical findings suggest hypotheses that as a country's tax administration system becomes more efficient, tax authorities depend more on direct taxes and less on indirect taxes.

Figure 2 plots how the main tax sources relate to ICT expenditure, and each graph shows a different shape. While personal income tax revenue share related positively, corporate income tax, VAT & Sales tax, and trade tax revenue shares related negatively with ICT expenditure share. Social security contributions and property tax revenue shares show no clear relationship with the wide dispersion of data. The summary statistics for data are listed in Table 3. The relationships in Figures 1 and 2 implicate that improvement in tax administration efficiency acts as a potential channel of the tax structure change. I analyze this channel using econometric models in the next chapter.

Table 3. Summary Statistics

Variable	Source	Obs.	Mean	Std. Dev.	Min	Max
Tax Revenue Share						
Direct Taxes			56.70	9.16	32.81	73.32
Indirect Taxes			33.06	8.41	8.90	56.60
Personal Income Tax	*OECD*		22.05	10.74	0	56.03
Corporate Income Tax	*Statistics*	519	11.49	8.35	0.50	54.65
Social Security Contributions			23.16	13.31	0	46.05
Property Tax			5.59	3.97	0	34.24
VAT & Sales Taxes			21.86	7.21	6.08	42.07
Trade Tax			1.20	1.71	0	14.2
ICT Expenditure Share over Operating Expenditure	*OECD Tax Administration*		10.89	8.32	0	54.87

Chapter 4. Models

I estimate two econometric models to analyze the question. The first model is OLS regression with fixed effects:

$$Y_{i,t} = \alpha + \beta\, ICT_{i,t} + X_{i,t}\,\gamma + \delta_i + \zeta_t + \epsilon_{i,t} \qquad (4.1)$$
$$i = 1, \ldots, N\,; country, \qquad t = 1, \ldots, T\,;\ \ year$$

where $Y_{i,t}$ is each tax source's revenue share collected in country i in year t. δ_i represents country fixed effects and ζ_t represents time effects. [5] The standard errors are clustered at the country level. $ICT_{i,t}$ denotes the ICT expenditure share of country i in year t. Its quadratic term, $ICT_{i,t}^2$ is additionally considered in further to capture possible nonlinear effect verified in the figures from Chapter 2. $X_{i,t}$ denotes a set of control variables. $\epsilon_{i,t}$ is the error term. For the control variables, I follow previous literature that studied determinants of the tax structure. I use real Gross Domestic Production (GDP) per capita to control economic development. Potential Tax bases are controlled by labor force participation rate, age dependency ratio, trade openness, and agriculture share. Civil Liberties and Political Rights are political factors. Description of measures and their sources are summarized in Table 4.

Moreover, the tax revenue share process tends to persist and be influenced by past ones. A positive serial correlation is also verified on all tax sources except property tax. This motivates to include the lag of the dependent variable in the right side of regression 4.1 alternatively, thus, I adopt a dynamic panel model. The difference GMM estimator does not include a time- invariant regressor and has a weak instrument problem. Instead, I adopt a two-step system GMM estimator (Blundell and Bond (1998), Arellano and Bover (1995))

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[5] Since the serial correlation is detected on the residuals from most of the tax sources, the Hausman test seems inapplicable. Instead, using the Mundlak approach (Mundlak (1978)), I reject the null hypothesis of supporting the random effects model and decide on the fixed effects model in all tax sources.

that works with the level equation 4.2 and employs both the difference and level of the lagged dependent variable, $\Delta Y_{i,t-1}$, $\Delta Y_{i,t-2}$ as the instruments:

$$Y_{i,t} = \alpha + \eta\, Y_{i,t-1} + \beta\, ICT_{i,t} + \mathrm{X}_{i,t}\,\gamma + \delta_i + \zeta_t + \epsilon_{i,t} \qquad (4.2)$$
$$i = 1, \dots, N\, ; country, \qquad t = 1, \dots, T\, ; \; year$$

$Y_{i,t-1}$ in the right−hand side of the equation represents the lagged term of the dependent variable. The explanations for the rest of the other variables are the same as equation 4.1.

Table 4. Descriptions for Control Variables

Variable	Measure	Source
Real GDP per capita	.	*OECD Statistics*
Labor Force Participation Rate	% of total population ages +15	*World*
Age Dependency Ratio	% old population over working-age population	*Development Indicators*
Trade Openness	Trade % of GDP	
Agriculture Share	Agriculture's Share over GDP	
Civil Liberties	Rating of 1 to 7	*Freedom*
Political Rights	Rating of 1 to 7	*House*

[1]Since the serial correlation is detected on the residuals from most of the tax sources, the Hausman test seems inapplicable. Instead, using the Mundlak approach(Mundlak (1978)), I reject the null hypothesis of supporting ddthe random effects model and decide on the fixed effects model in all tax sources.

Chapter 5. Results

This chapter presents the results from the regression 4.1, and 4.2 in the following tables. The estimation (1), (2), and (3) are the results from the regression 4.1, using a fixed effects model. I analyze whether each tax source is affected by ICT or its squared term, ICT^2 and whether the coefficient is significant after including control variables. The estimation (4) is the result from the regression 4.2 including additional lagged term of the dependent variable, Y_{t-1}. Table 5.1 shows the result of direct taxes. While no significant estimations are found in the fixed effects model, the dynamic panel model of estimation (4) indicates a significant and positive effect on direct taxes. As ICT expenditure share rises, its direct taxes revenue share concavely increases.

Table 5.1. Direct Taxes

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	0.004	0.02	0.05	0.19*
	(0.02)	(0.07)	(0.07)	(0.11)
ICT^2		-0.0003	-0.0011	-0.0046*
		(0.0017)	(0.0018)	(0.0027)
Y_{t-1}				0.87***
				(0.13)
Control	X	X	O	O
R^2	7.3e-05	0.0002	0.0871	
Hansen Test (p-value)				0.893
AR(1) Test (p-value)				0.006
AR(2) Test (p-value)				0.163
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***$p<0.01$, **$p<0.05$, *$p<0.10$. Constant is omitted.

For indirect taxes in Table 5.2, however, it shows statistically insignificant results through the whole estimations. The coefficient of ICT in estimation (4) shows a negative sign but is also insignificant. This outcome is different from the pattern observed in Figure 1. It does not provide evidence for the argument that the government with an efficient tax administration system relies less on indirect taxes.

Table 5.2. Indirect Taxes

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	0.02	0.02	0.01	-0.02
	(0.03)	(0.07)	(0.03)	(0.03)
ICT^2		3e-05		
		(0.0014)		
Y_{t-1}				0.83***
				(0.16)
Control	X	X	O	O
R^2	0.002	0.002	0.12	
Hansen Test (p-value)				0.497
AR(1) Test (p-value)				0.001
AR(2) Test (p-value)				0.596
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***p<0.01, **p<0.05, *p<0.10. Constant is omitted.

Table 5.3 shows personal income tax regression results. Estimations (2) and (3) show that ICT expenditure share has a positive and significant effect on personal income tax. The quadratic estimation denotes an increasing concave function of ICT. The coefficient is still positive after including the lagged term of the dependent variable in estimation (4), although the magnitude of a value slightly decreases. This outcome suggests evidence that the positive effect found in direct taxes might be attributed to personal income tax.

In Table 5.4, the result from estimation (2) shows that corporate income tax revenue share decreases concavely on ICT. The negative sign of the coefficients implies that the efficient government concavely lessens the tax burden from corporates. After including the control variables or the lagged dependent variable, the pattern is similar, but the values become statistically insignificant.

In the case of social security contributions in Table 5.5, an unexpected negative effect of ICT is verified. The absolute value of ICT becomes larger in the estimation (4), and we cannot reject the null hypothesis at a greater significance level. Property tax in Table

5.6 indicates an insignificant effect in the fixed effects model. The

Table 5.3. Personal Income Tax

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	0.02	0.13**	0.12**	0.10*
	(0.02)	(0.05)	(0.05)	(0.05)
ICT^2		-0.0027**	-0.0025**	
		(0.0011)	(0.0010)	
Y_{t-1}				0.81***
				(0.14)
Control	X	X	O	O
R^2	0.01	0.03	0.08	
Hansen Test (p-value)				0.162
AR(1) Test (p-value)				0.014
AR(2) Test (p-value)				0.142
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***p<0.01, **p<0.05, *p<0.10. Constant is omitted.

Table 5.4. Corporate Income Tax

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	0.01	-0.13*	-0.09	-0.07
	(0.03)	(0.07)	(0.06)	(0.09)
ICT^2		0.0034**	0.0028*	0.002
		(0.0016)	(0.0016)	(0.002)
Y_{t-1}				0.84***
				(0.13)
Control	X	X	O	O
R^2	0.0001	0.02	0.14	
Hansen Test (p-value)				0.620
AR(1) Test (p-value)				0.062
AR(2) Test (p-value)				0.230
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***p<0.01, **p<0.05, *p<0.10. Constant is omitted.

high p−value from Arellano−Bond AR(1) test could indicate the idiosyncratic error term, $\epsilon_{i,t}$ in levels is highly serially correlated, which is also verified by performing the Durbin−Watson test. 1 Therefore, a dynamic model would be inappropriate for this case. As I mentioned earlier, property tax contains a type of tax that could potentially be categorized into indirect taxes. Among the types of

Table 5.5. Social Security Contributions

Variable	Fixed Effects (1)	(2)	(3)	System GMM (4)
ICT	-0.03	0.02	-0.03*	-0.11***
	(0.02)	(0.05)	(0.02)	(0.03)
ICT^2		-0.0011		
		(0.0010)		
Y_{t-1}				0.82***
				(0.09)
Control	X	X	O	O
R^2	0.01	0.01	0.06	
Hansen Test (p-value)				0.674
AR(1) Test (p-value)				0.003
AR(2) Test (p-value)				0.327
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***$p<0.01$, **$p<0.05$, *$p<0.10$. Constant is omitted.

Table 5.6. Property Tax

Variable	Fixed Effects (1)	(2)	(3)	System GMM (4)
ICT	-0.01	-0.03	-0.01	0.0001
	(0.02)	(0.04)	(0.02)	(0.03)
ICT^2		0.0006		
		(0.0009)		
Y_{t-1}				0.56**
				(0.23)
Control	X	X	O	O
R^2	0.001	0.003	0.02	
Hansen Test (p-value)				0.233
AR(1) Test (p-value)				0.129
AR(2) Test (p-value)				0.200
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***$p<0.01$, **$p<0.05$, *$p<0.10$. Constant is omitted.

direct taxation, only personal income tax revenue share rises as tax administration becomes efficient.

On the other hand, a fixed effects model in indirect taxes shows an insignificant effect of ICT overall. VAT & sales in Table 5.7, and trade tax in Table 5.8 have no significant effect on either ICT in the form of linear or quadratic estimation. This outcome is consistent with aggregate indirect taxes in Table 5.2. The low p−value of the Arellano−Bond AR(1) test from trade tax denotes that a dynamic panel model is inappropriate for trade tax. To conclude, I do not find evidence that more efficient tax administration relies less on indirect taxation.

Table 5.7. VAT & Sales Taxes

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	-0.005	0.03	-0.01	-0.01
	(0.02)	(0.06)	(0.02)	(0.03)
ICT^2		-0.0009		
		(0.0013)		
Y_{t-1}				0.89***
				(0.11)
Control	X	X	O	O
R^2	0.0002	0.002	0.06	
Hansen Test (p-value)				0.654
AR(1) Test (p-value)				0.002
AR(2) Test (p-value)				0.145
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***$p<0.01$, **$p<0.05$, *$p<0.10$. Constant is omitted.

Table 5.8. Trade Tax

Variable	Fixed Effects			System GMM
	(1)	(2)	(3)	(4)
ICT	-0.001	-0.004	-0.001	0.001
	(0.003)	(0.009)	(0.004)	(0.008)
ICT^2		0.0001		
		(0.0002)		
Y_{t-1}				0.69***
				(0.12)
Control	X	X	O	O
R^2	9e-05	0.0003	0.19	
Hansen Test (p-value)				0.291
AR(1) Test (p-value)				0.150
AR(2) Test (p-value)				0.226
Obs.		519		380

Note: Standard errors in parenthesis and clustered by country level. ***$p<0.01$, **$p<0.05$, *$p<0.10$. Constant is omitted.

Chapter 6. Conclusion

This paper analyzes how tax administration efficiency affects the effectiveness of tax collection. The proxy variables from the previous papers, which are urbanization, population density, and education level, have fundamental limitations: They could affect other than tax administration efficiency and are not appropriate for the tax system nowadays. I suggest using ICT expenditure share from *OECD Tax Administration* as an alternative proxy variable.

Using a fixed effects model and a dynamic panel model with a two-step system GMM, the results show that ICT expenditure share positively affects direct taxation, especially for personal income tax. Social security contributions show unexpected negative signs. No significant effect is found on indirect taxation, including VAT & Sales taxes, and trade tax. These results provide evidence that the government can rely more on direct taxation, especially personal income tax, as its tax system becomes more efficient. I find no evidence that less indirect taxation is used when tax administration is more efficient.

The change in tax structure implies a shift in economic agents bearing the burden of expanding the government budget. Understanding the tax structure change correctly, therefore, would be the beginning of the government's responsibility for taxpayers.

Chapter 7. Appendix

[The List of 50 Countries]

Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Great Britain, The United States, Argentina, Brazil, Bulgaria, Indonesia, Kenya, Malaysia, Malta, Morocco, Peru, Singapore, South Africa, and Thailand.

[OECD Statistics Code for each tax source]

Personal Income Tax: 1100 'Taxes on income, profits, and capital gains of individuals'

Corporate Income Tax: 1200 'Taxes on income, profits, and capital gains of corporations'

Consumption Tax: 5000 'Consumption Taxes'

VAT & Sales Tax: 5110 'General Taxes'

Property Tax: 4000 'Taxes on property'

Social Security Contributions: 2000 'Social security contributions'

Trade Tax: 5123 'Customs and import duties' + 5124 'Taxes on exports' + 5127 'Other taxes on intern. trade and transactions'

Direct Taxes = Personal Income Tax + Corporate Income Tax + Social Security Contributions

Indirect Taxes = Consumption Tax + Trade tax

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Abstract

본 논문은 조세 행정의 효율성이 조세 징수의 유효성에 어떻게 영향을 미치는지 경험적으로 분석한다. 조세 행정의 영향을 규명하기 위해 많은 선행 논문에서는 인구 밀도, 도시화, 교육 수준과 같은 사회-인구학적 변수들을 대리 변수로 사용하였다. 이러한 변수들은 조세 구조에 미치는 경로가 명확하지 않고, 오늘날 정부가 조세 행정 시스템에서 ICT 활용한다는 점에서 한계를 가지고 있다. 이를 대신하여 본 논문에서는 OECD Tax Administration의 ICT 지출 비중(ICT expenditure share)을 대리변수로 제시한다. 정부가 조세 행정에서 ICT를 얼마나 잘 활용하는 지는 효율성을 결정하는 데 중요한 변수이기 때문이다. 본 논문에서는 50개 국가의 2007년부터 2020년까지의 패널 데이터를 사용하고, 고정효과 모형과 2단계 시스템 GMM을 적용한 동적 패널 모형을 사용한다. 분석 결과 ICT 지출 비중은 직접세에 양의 방향으로 영향이 있고, 특히 개인소득세에 영향이 있었다. 사회보장기금에는 음의 방향으로 영향을 미쳤고, VAT 및 판매세, 무역세와 같은 간접세에는 통계적으로 유의한 영향을 미치지 않았다. 이러한 분석 결과는 정부가 조세 행정 시스템이 효율적으로 변화할수록 직접세에 의존한다는 주장에 근거를 제시한다.