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The Effect of Direct and Indirect Taxes on Economic Growth in Developed Countries

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Abstract. This paper examines how the economic growth in advanced countries is affected by various types of tax revenue. Ten developed countries were chosen based on the Human Development Index, and data from 1995 to 2020 were examined using the feasible generalized least squares method. A total of 260 observations spanning 26 years were available for analysis. The purpose of this paper is to investigate the influence of direct and indirect taxes on economic growth in selected developed countries. According to our results, the growth of these countries was positively influenced by corporate income taxes and taxation on specific goods and services. However, there are adverse impacts from taxes on personal income, contributions to social security, and a tax on value-added. For a beneficial impact on these nations' growth, we suggest policymakers concentrate on taxes on corporations and specific services and goods. Furthermore, it is important to consider the adverse impacts of personal taxation and value-added taxation on growth.
Keywords: Economic Growth; Personal Income Tax; Corporate Income Tax; Value Added Tax; Social Security Contribution; Labor Tax; Property Tax; Tax on Specific Goods and Services

1. Introduction

For decades, there has been an increase in research interest in the influence of taxation on economic performance (Alinaghi & Reed, 2021). Governments can use tax policies as fiscal policy instruments to finance their investments and carry out certain expenditures (Korkmaz & Yilgor, 2019). Also, taxes can be used by governments to achieve multiple goals, such as growth and development, encouraging savings and investments, and increasing production, consumption, and employment (Korkmaz & Korkmaz, 2023).

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Tax revenue is a crucial component of a nation's growth since it represents one of the greatest contributors to total national income. If tax revenues are insufficient, a rise in the budget deficit, both domestically and abroad borrowing or servicing of debt can have an adverse effect on growth (Nazir, Anwar, & Nasreen, 2020). The need for additional revenue to finance increased public expenditure is often caused by economic developments, but it also increases the country's fiscal burden to meet these needs (Nguyen & Darsono, 2022).

The greater the state's engagement in economic activities, the greater the revenue its government will require, with taxes providing the majority of this revenue (Tanzi, 2011). According to Besley and Persson (2013), the average tax revenue in low-income nations is from 10 to 20% of GDP, whereas it exceeds 40% in wealthy ones (Elshani & Pula, 2023).

Plenty of discussions have taken place on comparing the advantages of various types of tax revenue, direct and indirect, with a focus on their potential to assist growth (Stoilova, 2017). The decision to use a combination of indirect and direct taxes plays a critical role in ensuring the optimal distribution of tax income and improving the economy's performance (Hakim, 2020). Martinez-Vazquez et al. (2011) show that across the 116 states, the average ratio of direct taxes to indirect taxes has increased during the previous three decades.

The ability of decisions concerning the tax structure to be effective is based on knowledge about how increases in taxes affect other factors. This paper's main goal is to examine how various taxes influence growth in wealthy nations to identify which kinds of direct and indirect taxes have a higher or lower impact on their growth. In our models, we have included personal income tax (PIT), value-added tax (VAT), corporate income tax (CIT), tax on specific goods and services (SGST), and some types of taxes with a smaller share of the GDP. It is important to understand the direction in which these types of taxes will influence economic growth so that optimal tax structures can be determined.

The remaining sections of the paper are arranged as follows. The following part is a review of the available literature. The third section illustrates the data and variables used in the econometric models, as well as the technique used in the article. The fourth section provides the research's outcomes and its discussions. Lastly, the fifth section presents the conclusions reached.

2. Literature review and hypothesis development

There is a wealth of literature on the tax-growth relationship. Based on panel data from 26 OECD nations from 1965 to 2007, Furceri and Karras (2008) discovered that higher taxes showed a negative influence on real GDP per capita. In contrast, Vintila et al. (2021) found a positive correlation between fiscal factors and GDP growth in OECD nations from 2002 to 2017. In a similar vein, the findings of Spulbar et al. (2021) imply that the amount of tax in EU-28 member countries is playing an increasingly crucial role in GDP dynamics. Furthermore, Hoang et al. (2021) revealed that the majority of taxes are favorable to growth in nations with low incomes, whereas taxation on services and goods can help increase growth in wealthy nations, after analyzing 63 countries' data between 2003 and 2017.

Much emphasis has been dedicated to the way taxes that are both direct and indirect affect development. Utilizing panel data from 51 nations from 1992 to 2016, Hakim (2020) discovered that, whereas indirect taxes appear to be a favorable but insignificant element for growth, direct taxes have a considerable and adverse effect on growth. Acosta-Ormaechea et al. (2019) show that increases in consumption and property taxation, along with declining income taxes, increased long-term growth across 70 countries from 1970 to 2009. Stoilova and Patonov (2013) argue that a system of taxation that relies on direct taxes is more beneficial for fostering the growth of EU members. Furthermore, the authors Elshani et al. (2018) observed, using data from 35 European nations from 2002 to 2014, that states using the linear tax had higher growth compared to those using the progressive tax. As such, numerous scholars examined the implications of taxing on growth using data from various nations and periods. Table 1 summarizes the investigations conducted in this area.

Table 1. The influence of taxation on growth

Authors	States	Period of time	The influence of taxation on growth
Hakim et al. (2022)	137 countries	2000–2020	Direct taxes have a beneficial impact on advanced nations but a detrimental impact on developing ones. In both countries, indirect taxes have an adverse connection.
Martinez-Vazquez et al. (2011)	116 states	1972–2005	Growth seemed to be negatively impacted by high direct-to-indirect tax ratios.
Alm & Rogers (2011)	USA	1947–1997	Although statistically important, the link between state tax policies varies greatly depending on the period and the particular collection of regressors used.
Stoilova (2017)	EU Member States	1996–2013	Tax revenue appears to have less harmful effects on growth for EU-28 member states.
Alfo et al. (2022)	21 OECD Countries	1965–2010	Growth is negatively impacted by taxation.
Arnold (2008)	21 OECD Countries	1971–2004	In general, taxes on income are less favorable for growth than consumption and property taxes.
Hakim (2020)	51 Countries	1992–2016	Direct taxes have an adverse effect, but indirect taxes have an insignificant beneficial effect.
Stoilova & Patonov (2013)	EU Member States	1995–2010	To support growth in EU countries, direct taxation is more efficient.

Source: Illustrated by authors.

Personal income taxation and growth

Several studies have been conducted to determine the effect of taxation on personal income growth. Widmalm (2001) discovered that personal income taxes (PIT) have a

detrimental effect on economic growth after researching 23 OECD nations between 1965 and 1990. Using regression analysis conducted on OECD nations between 2000 and 2011, Macek (2015) also discovered a negative correlation. Furthermore, Dackehag and Hansson (2012) examined data from 25 affluent OECD nations from 1975 to 2010 to show that PIT had an adverse effect on growth. Longer term, author Xing's (2011) study reveals that between 1970 and 2004, a rise in PIT income was associated with a decline in per capita GDP among 17 OECD nations. Based on data from 21 OECD states between 1971 and 2004, Arnold (2008) discovered that progressivity in PIT and growth also had an adverse relationship. Following the literature review, a hypothesis could be developed as follows:

H1: Personal income tax has an effect on the economic growth of developed economies.

Corporate income taxation and growth

Some scholars have identified a negative association between corporate income taxes and growth. Lee and Gordon (2005) found a substantial negative association between growth and the corporate tax rate after studying data from 70 nations between 1970 and 1997. According to their calculations, a ten percent corporation tax rate cut would be sufficient to increase the annual growth rate by roughly 1.1%. Oz-Yalaman (2019) discovered that corporation tax rates have considerable adverse effects on growth after examining data from 29 OECD nations between 1998 and 2016. Authors Nazir et al. (2020) examined data from 20 Asian nations with average incomes from 1990 to 2017 and found that corporate taxes have a detrimental effect on growth.

Other authors, however, discovered favorable associations. Stoilova (2017) discovered that corporation taxes have a favorable effect on growth; however, the association is not very strong. Corporate revenue tax rates are linked positively (significantly, though not strongly) with growth, according to the authors Angelopoulos et al. (2007). Kate and Milionis (2019) studied 77 OECD nations between 1965 and 2014. The association between capital taxes and growth is generally positive for advanced countries but statistically insignificant for developing countries in most circumstances, according to the authors' findings. Given that we take into analysis 10 developed economies over a long period, and this research focus has yielded that there are positive effects of corporate income tax on economic growth, the following hypothesis is put forth:

H2: Corporate income tax has an effect on the economic growth of developed economies.

Value-added taxation and growth

Chiricu (2019) examined how value-added tax (VAT) affects growth. The study's data for Southern European nations from 1996 to 2017 demonstrated that VAT has a significant favorable impact on growth. Elshani and Ahmeti (2017) contend that VAT has a favorable impact on European nations' growth that implement progressive taxes. Acosta-Ormaechea and Yoo (2012) also noted, after examining 69 nations with different income levels from

1970 to 2009, that VAT and sales taxes are significantly favorably connected with growth.

On the other side, Stoilova (2017) demonstrated how the implementation of VAT negatively impacts the EU-28 economies. Alm and El-Ganainy (2012) demonstrate that a 1% increase in VAT would cause a short-term, roughly 1% fall in overall consumption, followed by a longer-term, somewhat more substantial decline. The study covered 15 EU nations between 1961 and 2005. Most studies covering developed economies covered in our study report a negative impact of value-added tax on economic growth. Therefore, we can put forward the following hypothesis:

H3: Value-added tax has an effect on the economic growth of developed economies.

Customs duties, excise duties, and growth

According to empirical research by Elshani and Pula (2023), the GDP of nations in the Euro region is negatively impacted by customs and excise duties. The authors Elshani and Ahmeti (2017) reached the same outcome. Additionally, Aliyu and Mustapha (2020) concluded that between 1981 and 2017, customs and excise duties harmed Nigeria's growth.

Customs duties and excise have a favorable correlation with Nigeria's growth, according to research by authors Ibadin and Oladipupo (2015), who examined data from 1981 to 2014. Owino (2019) discovered similar findings after examining data for Kenya from 1973 to 2010. Given that extant studies investigating this relationship overlook developed economies, in our case, we postulate a positive relationship, given the obvious differences with emerging economies. Hence, we formulate the following hypothesis:

H4: Customs and excise duties have an effect on the economic growth of developed economies.

3. Methodology

This section presents the econometric models that were applied to examine the connection between revenue from taxes and growth. The Panel Data method is used for data analysis. We rely on this method due to its demonstrated feature of evaluating temporal and cross-country changes (Petranov, Zlatinov, & Atanasov, 2022). In this paper, two econometric models have been built, where the response variable is economic growth, namely the GDP growth rate for model 1 and the GDP per capita growth for model 2, the data for which were taken from the World Bank database. These variables were also used by other authors, including Widmalm, 2001; Martinez-Vazquez et al., 2011; Stoilova, 2017; Elshani & Pula, 2023; Lee & Gordon, 2005; Johansson et al., 2008; Stoilova & Patonov, 2013; Hakim et al., 2022; Hoang et al., 2021; and Elshani & Ahmeti, 2017. Whereas the regressors in the model are Income from personal income tax (PIT), corporate income tax (CIT), social security contributions (SSC), labor force taxes (TPW), property tax (TP), value-added tax (VAT), and tax on specific goods and services (SGST). Data for all explanatory variables are taken from a database of the OECD and given as a percentage

of GDP. VAT and SGST are examples of indirect taxes among the taxes included as explanatory variables in our models; direct taxes make up the remaining tax categories.

The study includes ten developed nations, namely: Australia, Denmark, Finland, Germany, the Netherlands, Ireland, Norway, Sweden, the United States of America, and Switzerland. The Human Development Index (HDI), a development indicator published by the United Nations Development Program, was used to choose the nations that were part of the study. An HDI value nearer one indicates more development. This indicator has a level greater than 0.9 in each of the nations included in our paper. According to the United Nations Development Program (2021): Australia (0.951), Denmark (0.948), Finland (0.940), Germany (0.942), Ireland (0.945), the Netherlands (0.941), Norway (0.961), Sweden (0.947), Switzerland (0.962), and the USA (0.921).

The following table shows the economic growth and different types of tax revenues to GDP as an average for the years 1995-2020 in the developed nations included in the paper.

Table 2. Tax revenues in % of GDP and economic growth, by country.

Nr	State	GDP	GDP/cap	PIT	CIT	SSC	TPW	TP	VAT	SGST
1	Australia	3.05	1.62	11.38	4.97	0.00	1.42	2.63	2.83	3.43
2	Denmark	1.54	1.10	24.56	2.79	0.15	0.25	1.79	9.37	5.00
3	Finland	2.11	1.78	12.98	3.00	12.04	0.00	1.17	8.47	4.78
4	Germany	1.22	1.14	9.23	1.62	14.02	0.00	0.93	6.67	3.17
5	Ireland	5.85	4.52	8.87	2.98	4.09	0.20	1.69	6.07	3.38
6	Netherlands	1.84	1.35	6.86	3.18	13.59	0.00	1.60	6.60	3.50
7	Norway	1.98	1.14	10.15	7.49	9.56	0.02	1.11	8.15	3.59
8	Sweden	2.37	1.73	14.00	2.84	11.24	3.24	1.24	8.66	3.13
9	Switzerland	1.71	0.88	8.23	2.50	6.45	0.00	2.14	3.28	1.71
10	USA	2.27	1.37	9.97	2.02	6.31	0.00	3.11	0.00	1.76

Source: OECD, compiled by authors, average data for the period 1995-2020.

From the table above, Denmark has the largest share of revenues from TAP in GDP with 24.56%, followed by Sweden with 14% and Finland with 12.98%. However, the Netherlands has the lowest share of this tax with 6.86%, followed by Ireland with 8.87%. Regarding VAT revenues, Norway has the highest share of these revenues in GDP with 7.49%, followed by Australia with 4.97%. However, Germany had the lowest participation with 1.62%. Denmark has the highest share of VAT revenue in GDP at 9.37%.

The study was conducted for 26 years, starting from 1995 to 2020, resulting in a total of 260 observations (10 countries for 26 years). The FGLS technique was applied for both models because of the correction for the existence of cross-sectional dependency, heteroskedasticity, and autocorrelation.

Table 3. Details and description of variables for model 1 (M1) and model 2 (M2)

Variables	Abbre-viations	Types of variables	Calculation	Source
Gross Domestic Product	GDP	Dependent variable (M1)	Annual growth rate	World Bank Data
Gross Domestic Product per capita	GDP/ cap	Dependent variable (M2)	Annual growth rate	World Bank Data
Personal Income Tax	PIT	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Corporate Income Tax	CIT	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Social Security Contribution	SSC	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Labor Tax	TPW	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Property tax	TP	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Value Added Tax	VAT	Independent variable (M1, M2)	Percentage share of GDP	OECD Data
Tax on Specific Goods and Services	SGST	Independent variable (M1, M2)	Percentage share of GDP	OECD Data

Source: Illustrated by authors.

The econometric models used in our research are as follows:

Model 1 (GDP Growth):

$$Y_{it} = \alpha + \beta_1 PIT + \beta_2 CIT + \beta_3 SSC + \beta_4 TPW + \beta_5 TP + \beta_6 VAT + \beta_7 SGST + \mu_{it} + \epsilon_{it}$$

Model 2 (GDP Growth per capita):

$$Y_{it} = \alpha + \beta_1 PIT + \beta_2 CIT + \beta_3 SSC + \beta_4 TPW + \beta_5 TP + \beta_6 VAT + \beta_7 SGST + \mu_{it} + \epsilon_{it}$$

Where:

PIT – Personal income tax
CIT – Corporate income tax
SSC – Social Security contribution
TPW – Labor tax
TP – Property tax
VAT– Value-added tax
SGST– Tax on specific goods and services.

According to the Hausman test, the fixed effects model is better suited to model 1 than the one with random effects. However, the existence of problems with cross-sectional dependence, autocorrelation, and heteroskedasticity has been proven through diagnostic tests. Model 2, in which the Hausman test results showed a model with a random effect

as the best fit, has also shown similar problems. The FGLS approach is used to correct these issues.

4. Results and discussions

To describe the study's variables, descriptive statistics were used. In descriptive statistics, all variables are present.

Table 4. Descriptive statistics for Model 1 and Model 2

	GDP	GDP cap	PIT	CIT	SSC	TPW	TP	VAT	SGST
Mean	2.39	1.66	11.62	3.34	7.74	0.51	1.74	6.01	3.34
Std.Dev.	2.87	2.81	4.86	1.93	4.97	1.09	0.70	2.96	1.15
Min.	-8.07	-8.51	5.6	0.6	0	0	0.8	0	1.6
Max.	24.37	23.20	26.2	12.6	15	5.3	4.3	10	6.3
Obs.	260	260	260	260	260	260	260	260	260

Source: Illustrated by authors.

The table above includes descriptive data for all the variables this study looked at. In terms of average tax revenues, the biggest tax revenues on average are PIT revenues, which account for 11.62% of GDP in the nations studied, followed by the contribution to social security with 7.74% of GDP and the value-added tax with an average of 6.01% participation in GDP.

Next, the correlation analysis is shown. Table 5 illustrates the correlation between economic growth (measured as GDP and GDP per capita) and PIT, CIT, SSC, labor tax, property tax, VAT, and SGST in the advanced nations covered by this study from 1995 to 2020.

Table 5. Correlation analysis

Variables	GDP	GDP/cap	PIT	CIT	SSC	TPW	TP	VAT	SGST
GDP	1.000								
GDP/cap	0.983***	1.000							
PIT	-0.086	-0.051	1.000						
CIT	0.103*	0.043	-0.065	1.000					
SSC	-0.169***	-0.075	-0.447***	-0.143**	1.000				
TPW	0.010	-0.027	0.159**	0.024	-0.078	1.000			
TP	0.060	-0.020	-0.025	-0.111*	-0.582***	-0.086	1.000		
VAT	-0.093	-0.028	0.456***	0.138**	0.285***	0.162***	-0.781***	1.000	
SGST	0.104*	0.161***	0.573***	0.126**	-0.049	-0.045	-0.417***	0.676***	1.000

Source: Illustrated by authors. *Note: *** p<0.01, ** p<0.05, * p<0.1.*

Model 1's dependent variable was GDP growth. The following analysis reveals a positive relationship between corporate income tax (0.103) and tax on specific goods and services (0.104) and GDP growth. However, there is a negative link between PIT (-0.086), SSC (-0.169), and VAT (-0.093) and GDP growth. Additionally, it is seen that there is a positive connection between GDP per capita and SGST (0.161) and CIT (0.043). All other types of taxes, beginning with PIT (-0.051) and VAT (-0.028), show a negative relationship with GDP per capita growth.

Nonetheless, for both models, the correlation analysis discovered that CIT and SGST show a positive influence on the growth of the developed nations involved. Then, according to these results, PIT and SSC have an adverse influence on these states' growth.

The findings of the Breusch and Pagan Lagrangian multiplier test, which was used to evaluate the importance of random effects, are shown in Table 6. Because the null hypothesis was rejected in our case and both models had prob > chi2 values of 0.0000, it was determined that random effects have significance in these models. Because there are significant variations between countries, these findings demonstrate that we cannot depend on straightforward OLS regression estimates. In conclusion, it can be claimed that for both models at this point, a random effect model appears more appropriate than an OLS model.

Table 6. Breusch and Pagan Lagrangian Multiplier Test Results.

Estimated result:					
Test: Var (u) = 0					
M1 (Model 1)			M2 (Model 2)		
	Var	sd = sqrt (Var)		Var	sd = sqrt (Var)
GDP	8.281634	2.877783	GDPcap	7.903981	2.811402
e	6.040608	2.457765	E	6.051313	2.459942
u	2.210371	1.486732	U	1.642833	1.28173
chibar2 (01)	23.76		chibar2 (01)	15.79	
Prob > chi2	0.0000		Prob > chi2	0.0000	

Note: In the table above "e" is the Usual Error term and "u" is the Random Effects term.
Source: Illustrated by authors.

In the case of both models, after demonstrating that a random effect model is superior to the OLS model, the study proceeded toward selecting between the RE (random effects) model and the FE (fixed effects) model. Table 7 displays the Hausman test findings for this purpose.

Table 7. Hausman Test Results.

Test: H_0: difference in coefficients not systematic		
	Model 1	Model 2
	Coef.	Coef.
Chi-square test value	16.104	9.191
P-value	0.024	0.239

Source: Illustrated by authors.

Based on these findings, we determine that, for model 1, the FE model is a better fit than the RE model ($p = 0.0242$, $p < 0.05$). As a result, the null is rejected, and it is demonstrated that the systematic difference in the coefficient favors the FE model. Regarding model 2, the test findings demonstrate that, with $p = 0.239$, the RE model is a better match than the FE model, supporting the null hypothesis and demonstrating the non-systematic nature of the coefficient difference in this model.

Diagnostic tests should be carried out to ascertain whether the models chosen by the Hausman test are free from issues such as cross-sectional dependency, heteroscedasticity, autocorrelation, and multicollinearity. All of this is done to ensure that the econometric model's outputs are as accurate and dependable as possible, as the existence of these issues may lead to deviations in the model's output. Next are the outcomes of the diagnosis tests and the corresponding explanations for each of the aforementioned issues, starting with the Breusch-Pagan LM test to check for cross-sectional dependence before moving on to the Woodridge test for checking autocorrelation and the Modified Wald test to look for heteroskedasticity. To determine whether there is an unacceptable correlation among the regressors included in the model, the testing phase also involves testing for multicollinearity.

According to De Hoyos and Sarafidis (2006), Breusch and Pagan's LM test can be applied to check for the presence of cross-sectional dependency when T (dimension of time) > N (dimension of cross-section). Because in our case, T > N (T = 26 years, N = 10 countries), we can use this test to examine cross-sectional dependence. Table 8 shows the results of this test. The results indicate that we are unable to accept the null hypothesis in any of the models since pr = 0.0000, so pr < 0.05 for both models. As a result, we conclude that the panels are interconnected.

Table 8. Results of the Breusch-Pagan LM independence test

H_0: residuals across entities are not correlated	
Model 1	Model 2
chi2(45) =357.562	chi2(45) = 373.673
Pr = 0.0000	Pr = 0.0000
Based on 26 complete observations over panel units	

Source: Illustrated by authors.

The findings of the Woodridge test for detecting autocorrelation in panel data are provided in the table below. The null states that there is no first-order autocorrelation.

Table 9. Estimated results of the Woodridge Test.

H_0: no first-order autocorrelation	
Model 1	Model 2
F (1,9) = 26.038	F (1,9) = 22.223
Prob > F = 0.0006	Prob > F = 0.0011

Source: Illustrated by authors.

We've rejected the null hypothesis and found that autocorrelation exists in models 1 and 2 based on this test, as Prob > F < 0.05 in both models.

After testing for autocorrelation, from which we concluded that model 1 with fixed effects has the presence of autocorrelation, we continued with tests for heteroskedasticity.

Table 10. Modified Wald test for group heteroskedasticity.

H_0: Sigma (i)^2 = sigma^2 for all i	
Model 1	
chi2 (10)	384.30
Prob>chi2	0.0000

Source: Illustrated by authors.

The modified Wald test for group heteroscedasticity was applied in model 1 with fixed effects to establish whether it is inclusive of homoscedasticity. Homoscedasticity, or constant variation, is the null hypothesis. Since prob > chi2 = 0.0000 and prob > chi < 0.05, we concluded heteroskedasticity. Table 10 gives the results of this test carried out on our model.

To assess whether multicollinearity is present, we use the variance inflation factor (VIF) indicator. The findings of this test apply to both models because the regressors are alike in both. Table 11 displays these outcomes. Given that VIF < 10 and tolerance 1/VIF > 0.1 are true for all variables, we can conclude that multicollinearity does not occur.

Table 11. Testing for multicollinearity through VIF (Variance Inflation Factor).

Model 1 and Model 2		
Constant	1/VIF (Tolerance)	VIF
VAT	0.162	6.167
TP	0.222	4.500
PIT	0.312	3.207
SSC	0.370	2.702
SGST	0.409	2.445
CIT	0.803	1.245
TPW	0.876	1.141
Mean		3.058

Source: Illustrated by authors.

From the above tests, in summary, we can conclude that model 1 with fixed effects contains cross-sectional dependence, autocorrelation, and heteroskedasticity, while model 2 with random effects after testing revealed autocorrelation and cross-sectional dependence. To achieve effective results, all of the issues identified above had to be addressed. The Feasible Generalized Least-Squares method is advised for working with panels where T (dimension of time) is bigger than N (dimension of cross-section). Hoechle (2007) states

that the constraint N<T is required for this regression to be possible. Since we have data for 10 nations for 26 years, in our example T>N, the FGLS approach, which accounts for heteroskedastic panels and the presence of autocorrelation, was thought to be suitable for model 1. Model 2 has also been subjected to the FGLS approach, taking autocorrelation and cross-sectional dependency into account. In line with Bai et al. (2020), when heteroscedasticity, serial, and cross-sectional correlations occur, the proposed FGLS estimator is a better choice than OLS.

Table 12 presents the outcomes of the analysis we conducted, allowing us to determine which tax types influence development. According to both models, corporate income taxes as well as taxes on specific goods and services show a favorable influence on the growth of the advanced nations included in our research, with SGST being significant ($p<0.01$) in the two models and CIT being significant just in the first one. Taxes on personal income and value-added tax, on the other hand, show an unfavorable effect on these countries' growth. In the two models, VAT is significant ($p< 0.05$ in M1, $p< 0.10$ in M2), whereas PIT is significant ($p< 0.1$) only in the second model.

Table 12. Results with FGLS for Model 1 (M1) and Model 2 (M2)

FGLS									
Dependent variables: For M1: GDP For M2: GDP/cap			**Independent Variables**						
		Cons.	**PIT**	**CIT**	**SSC**	**TPW**	**TP**	**VAT**	**SGST**
M1	Coef. Sig.	1.435 (0.470)	-0.064 (0.364)	0.155* (0.071)	-0.012 (0.862)	0.162 (0.440)	-0.201 (0.693)	-0.33** (0.013)	0.912*** (0.000)
	St.Err.	1.985	0.07	0.086	0.072	0.21	0.509	0.133	0.215
	t-value	0.72	-0.91	1.80	-0.17	0.77	-0.39	-2.48	4.24
M2	Coef. Sig.	4.445** (0.041)	-0.156* (0.066)	0.062 (0.640)	-0.132* (0.086)	0.067 (0.770)	-1.032 (0.100)	-0.34* (0.064)	1.077*** (0.000)
	St.Err.	2.172	0.085	0.132	0.077	0.23	0.628	0.184	0.309
	t-value	2.05	-1.84	0.47	-1.72	0.29	-1.64	-1.85	3.49
Significance of the model			**Model 1: FGLS**				**Model 2: FGLS**		
			Wald chi2(7) = 32.34 Prob > chi2 = 0.0000				Wald chi2(7) = 21.31 Prob > chi2 = 0.0033		
*** 1%, ** 5%, * 10%									

Source: Illustrated by authors.

The FGLS approach outcomes were used in this section to assess the hypotheses, and then our outcomes were compared with those of other authors. Firstly, we demonstrated the significance of each of the models M1 and M2, with Prob> chi2 = 0.0000 and Prob> chi2 = 0.0033, respectively.

Hypothesis H1 is confirmed. The outcomes in model 2 showed that the personal income tax has a significant adverse effect ($p< 0.1$) on the growth of developed nations, whereas the effect in model 1 was positive but insignificant. The GDP per capita decreases by an average of 0.16% for every 1% rise in the percentage of PIT income in the GDP. Several studies have shown similar results (Macek, 2015; Widmalm, 2001; Dackehag & Hansson, 2012; Xing, 2011; Elshani & Ahmeti, 2017; Arnold, 2008; Acosta-Ormaechea et al., 2019; Elshani & Pula, 2023; Alfo et al., 2022). A rise in PIT can cause disposable income to reduce, which in turn causes a dip in the rate of savings and consumption and raises the chances of unfavorable effects on growth.

Hypothesis H2 is accepted. Corporate income tax has a beneficial and significant effect on growth. An increase of 1% in CIT's share of the GDP results in an average 0.15% boost in GDP growth. This tax has an insignificant but favorable effect on GDP per capita. Other research revealed similar results (Elshani & Pula, 2023; Stoilova, 2017; Angelopoulos et al., 2007; Kate & Milionis, 2019; Elshani & Ahmeti, 2017; Hoang et al., 2021). This conclusion could be explained by the fact that CIT is an important part of financing tax revenue investment in public services. Consequently, this tax contributes to the growth of the economy (Hoang et al., 2021).

The third hypothesis is accepted. VAT revenues have an adverse and significant ($p< 0.05$) influence on GDP and GDP per capita. According to our findings, a 1% rise in the share of VAT income in GDP indicates a 0.33% decrease in GDP in the developed nations studied. An average reduction of 0.34% in GDP per capita occurs when the participation of this tax in GDP increases by 1%, as the significance of the finding was $p<0.1$. Our findings match those of Alm and El-Ganainy (2012) and Stoilova (2017). One possibility for this result could be that customers' increased prices due to the VAT rise motivate them to consume less. Consequently, when consumption as an element of GDP reduces, an unfavorable effect on growth might occur. It should be noted that some researchers (Elshani & Ahmeti, 2017; Acosta-Ormaechea & Yoo, 2012; Chiricu, 2019; Elshani & Pula, 2023) have been able to determine a favorable effect of VAT on growth.

Hypothesis H4 is fully accepted. Within the revenues from specific goods and services, customs and excise have a beneficial and significant ($p<0.01$) influence on growth. Whereas a rise of 1% in the share of revenues from specific goods and services in the GDP influences GDP growth in these countries by an average of 0.91%. Some authors, like Owino (2019) and Ibadin & Oladipupo (2015), reached similar conclusions. Taxes on goods and services enhance growth in rich nations (Haong et al., 2021).

Apart from a discussion of the outcomes, we looked at a few more research outcomes. The growth of GDP per capita is negatively and significantly ($p < 0.1$) influenced by social security contributions. Our findings are consistent with those of some authors, such as Acosta-Ormaechea et al. (2019); Furceri & Karras (2008); Vintila, et al. (2021). This is because social security contributions are paid to finance social welfare, which does not generally result in growth (Feldstein, 1974). Our findings show that property taxes have an insignificant but adverse impact on GDP per capita. Additionally, Furceri and Karras (2008) demonstrate that GDP per capita is negatively affected by property taxes, although their findings do not seem to be statistically significant.

5. Discussion and conclusions

In this research, ten advanced nations were chosen based on the Human Development Index, and the influence of taxes, both direct and indirect, on economic growth was examined. The results of several researchers have been provided through this review; these results were then compared to our own. We came up with hypotheses based on the literature review. Regarding how various taxes influence development, we put forth four hypotheses. All hypotheses that have been put forth have been verified.

We concluded that the personal income tax, as a direct tax, has an adverse effect on growth, whereas, in the second model, this effect was statistically significant and, as such, should be kept at low levels to encourage growth through higher consumption. This was found after evaluating the influence of various types of revenues from taxes on the growth of the advanced nations covered by this paper. From our analyses, we conclude that GDP per capita decreases by an average of 0.16% for every 1% rise in the percentage of PIT.

Meanwhile, the economies of these nations were favorably impacted by the corporate income tax, another form of direct tax that was important in the first model. Regarding the value-added tax, we discovered that, in each model, this kind of indirect tax had a significant and adverse effect on growth. Whereas, the growth of these states has been positively and significantly affected by the Tax on Specific Goods and Services, an indirect tax. Regarding our results, an increase of 1% in the CIT reflects on an average 0.15% boost in GDP growth.

According to our findings, a 1% rise in the share of VAT income in GDP causes a 0.33% decrease in GDP in the developed nations included in our study. An average reduction of 0.34% in GDP per capita occurs when the participation of this tax in GDP increases by 1%. With these results, we confirm that VAT has an impact on GDP and GDP per capita. Also, as confirmed in our fourth hypothesis a rise of 1% in the share of revenues from specific goods and services in the GDP influences GDP growth in these countries by an average of 0.91%.

It is obvious that development can be assisted by an optimal tax structure. Thus, to reach the goal of growth, policymakers should concentrate on identifying that structure. The analyzed nations' growth is positively impacted by the rise in SGST and CIT revenue collection. As a result, these taxes need to be considered on the way to attaining economic growth.

We recommend policymakers consider the benefits of corporate income taxation and specific goods and services taxes for growth. To reduce the adverse effect on growth, it is also useful to consider the unfavorable impacts of value-added tax and personal income tax.

Countries should work toward creating a fiscal environment that encourages saving and investment and provides work incentives. The negative impact of income tax means that many other factors can affect the economic growth of a country in addition to tax structures, for example, socio-political factors and technology.

This finding provides additional support and confirmation to the existing research on how different tax structures may impact the economic growth of a particular country

differently. Hence, policymakers are recommended to revisit the tax structures of their countries if they want to enhance the positive impact of taxes on their countries' economic development, explicitly securing more investment and reducing the unemployment rate.

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