

The impact of the effective tax rate change on financial assets of commercial banks: The case of Visegrad group countries

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Abstract: While many tax professionals have discussed corporate taxation in the banking sector and its effectiveness on bank institutions, investment decisions, bank size, asset structure, or bank rentability, there is little evidence of tax efficiency within V-4 Group. The research on banks and tax rates is mainly based on American data. Few papers solved banking stability and corporate taxes within the European countries. This paper examines effective corporate taxation in the banking sector of the V-4 Group and aims to find out how the effective tax rate change affects commercial banks' financial assets. In this study, we examine the relationship between variables using regression analysis in which we assess the impact of ETR on bank financial assets. We examined data in the consolidated financial statements data of commercial banks and tested their impact on the economy. Our findings supported the theory that ETR impacts the banking sector, particularly capital and equity financing. However, the results did not prove the research hypothesis, in which we assumed that an increase in ETR would lead to an increase in financial assets. Based on our results, it leads to an increase in equity assets (7.34%) and a decline in debt assets (16.83%).

Keywords: Tax effectiveness, banking sector, tax competitiveness, taxable income.

JEL Classification: H20, H21, H25.

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Introduction

The tax burden of financial transactions is a complicated issue mainly due to discrepancies in financial and non-financial characteristics. The effective tax rate (ETR) is an average rate that expresses a percentage of tax expenditure of the total taxable income. Compared to the statutory tax rate (STR), ETR is a better

indicator for investment decisions and foreign investors because it determines the real level of taxation. Each country has its fiscal policy and sets the level of STR individually, so there are some tax disparities between the countries. Therefore, within the V-4 Group, analysing these differences in tax rates is meaningful. Our research aims to understand the differences

between ETR and STR better and tries to provide evidence that investment decisions would be based on an analysis of the effective rate rather than the statutory tax rate.

We identify differences between the V-4 countries related to ETR in commercial banks. We analyse ETR based on regression analysis. According to empirical findings, V-4 countries are remarkably similar in developing debt assets and bank rentability. We selected the research sample based on common characteristics in the financial as well as the economic development of this group. We wanted to contribute to empirical findings on how the change of effective tax rate affects the financial assets of V-4 Group's commercial banks.

Moreover, we aim to support the discussion on tax harmonisation within the Eurozone area. Data were retrieved from the consolidated financial statements of commercial banks and the ECB Statistical Warehouse. The article aims to evaluate how change in ETR affects commercial banks' financial assets. We assume that internal factors correlate more with ETR than external ones.

The first section of the article discusses a literature review in the field of effective taxation. The second section describes methods. In the third section of this contribution, we compare the development of the internal (bank rentability, debt assets, equity assets, net interest income, cost-income ratio) and external factors (economic growth, nominal statutory tax rate, gross fixed capital formation, inflation rate) in the selected countries. In the fourth part, based on the regression model, we analyse ETR in commercial banks in the V-4 Group, and the last part concludes.

1. Theoretical background

Most studies examine corporate tax rates based on non-financial companies' or multinational enterprises' data (Farah et al., 2021; UNCTAD, 2020) or evaluate corporate rates related to tax competitiveness, economic stability, and tax revenues. Zeng and Peng (2020), Sosnowski (2020) and Podvieszko et al. (2019) found that lower levels of tax rate affects positively on stability tax competitiveness of the national economy and eliminate the shadow economy.

In the research of financial institutions, recent taxation studies focus on determining factors that influence ETR. These studies are based on American data (Schandlbauer,

2017) or Australian data (Murphy, 2017), but there is a gap in European research. Based on the European data, Delgado et al. (2014) analysed differences between ETR and STR and their change in bank size, asset structure and rentability. They proved that different tax rate levels provide to countries' tax competitiveness. Overesch and Wolff (2019) investigated ETR in European banks and non-financial firms and found a negative correlation between ETR and bank size. Moreover, international commercial banks react better to ETR changes than small domestic banks. Masiukiewicz and Dec (2012) dealt with ETR in the financial crisis and analysed its impact on bank taxes in the EU.

The evidence about the impact of ETR on banking performance provided studies by Kohlscheen et al. (2018), Schandlbauer (2017), and Gallemore et al. (2017), which confirmed that if ETR increases, better-capitalised banks will reduce capital financing and focus on debt financing. From earlier studies, it is known that the higher ETR, the higher operational costs and the lower cash flows and financial performance of commercial banks. Fiordelisi et al. (2011) pointed out the opposite, meaning a reduction of ETR will lead to lowering costs and inefficient risk management in non-financial firms. However, no unambiguous evidence exists that higher ETR directly affects financial assets. The reason can be that if ETR changes, banks may change the structure of financial assets and use ETR to manage regulatory capital. Gallemore et al. (2017) found that, on average, financial institutions, compared to non-financial firms, have a low correlation of ETR with taxable income, liquidity, debt, and risk. Andries et al. (2017) and Dietrich and Wanzenried (2011) confirmed an inverse correlation between ETR and the financial stability of commercial banks (measured as ROA). Burger and Moormann (2008), Slemrod (2004) and Hanlon and Heitzman (2010) provided evidence that ETR affects non-financial activities. Shevlin et al. (2017), Richardson and Lanis (2007), Nicodème (2002), and Gilson and Schizer (2003) examined ETR and risk speculative strategies, and they concluded that change in ETR will lead to capital outflows to countries with low taxation. Other studies (Baltagi et al., 2006; Chaudhry et al., 2015; Claessens & Laeven, 2005; Hau, 2006) are focused on analysing the effects of the different tax systems on economic activity and economic stability. However, from these

findings, it is unclear to what extent fiscal policy regulation is sufficient and when it is necessary to coordinate economic stability with the central bank. Generally, there is an agreement that bank regulation, equity assets and net interest income have statistically insignificant influence on tax rates and economic growth and that ETR positively influences economic development (Gaston & Song, 2014).

Tab. 1 concludes research areas focused on analysing effective rates in the banking sector.

We assume that commercial banks' taxation statistically significantly influences banks' internal environment. In the regression model, we evaluate ETR as an independent variable and ROA, debt assets, equity assets, net interest income, cost-income ratio, GDP growth, STR, fixed investments and inflation rate as dependent variables. In literature and practice (Tab. 2), most studies use econometric models for the analysis of effective rates (Gambacorta

& Murcia, 2020; Langedijk et al., 2014; Sundarasan & Wang, 2014). Difference-in-difference analysis (Schandlbauer, 2017), or dynamic general equilibrium models (Boscá et al., 2019).

Our current paper contributes to knowledge of how the change of effective tax rate affects the financial assets of commercial banks of V-4 Group. We were motivated to write this study to draw attention to effective tax rates in the banking sector. As there is a lack of research with similar specifications, the prime aim was to support the discussion about tax harmonisation within the eurozone area.

2. Research methodology

Theoretical findings by Feeny et al. (2005), Wilkinson et al. (2001) and Stavarek (2005) indicate that equity assets are positively correlated with the tax rate. Fewer studies, such as Delgado et al. (2014), provided evidence of a negative correlation between ETR and debt assets. The sample was realised based

Tab. 1: Empirical research focused on ETR

Authors	Research area	Findings
Nicodème (2002) Delgado et al. (2014) Overesch and Wolff (2019) Masiukiewicz and Dec (2012)	Analysis of ETR and statutory tax rate in the EU states	Different level of tax rates within the EU states harms competitiveness; confirmed a negative correlation between ETR and bank size
Schandlbauer (2017) Kohlscheen et al. (2018) Gallemore et al. (2017) Andries et al. (2017) Dietrich and Wanzenried (2011)	Analysis of ETR, banking activities and bank regulation	A bank price policy of higher interest margin would lead to a negative correlation between ETR and profitability
Hau (2006) Baltagi et al. (2006) Chaudhry et al. (2015)	Analysis of ETR and fiscal policy	Economic growth has an impact on the banking system and bank competitiveness
Claessens and Laeven (2005) Gaston and Song (2014)	Analysis of ETR and economic activities	Confirmed negligible statistical significance between tax rate and economic growth
Burger and Moormann (2008) Slemrod (2004) Hanlon and Heitzman (2010) Fiordelisi et al. (2011)	Analysis of ETR and managing business activity	Tax rates can be used as an instrument for managing the stability of a company
Richardson and Lanis (2007) Nicodème (2002) Gilson and Schizer (2003) Shevlin et al. (2017)	Analysis of ETR and tax optimisation	Differences in effective and statutory tax rates can be used for speculative strategies such as tax optimisation or capital transfers

Source: own

Tab. 2: Methodology used for analysing ETR

Authors	Methodology	Research area
Langedijk et al. (2014)	Regression model based on panel data	Analysis of debt costs in banking structure and its influence on tax rates and gross public debt in economic crisis
Schandlbauer (2017)	Difference-in-difference analysis	Comparison of a change of statutory tax rate on capital structure in American banks and financial institutions
Gambacorta and Murcia (2020) Sundaresan and Wang (2014)	Econometric model	Examination of a change of tax rates on the fair value of liabilities in the balance sheet of commercial banks
Boscá et al. (2019) Alves (2018)	DSGE model	Examination of taxes on the banking sector in small open economies

Source: own

on the V-4 Group, i.e., the Czech Republic, Hungary, Poland, and Slovakia, because these countries are economically and historically close. Therefore, we want to determine whether they are harmonised with taxation within the banking sector. We assume that ETR in the V-4 Group has a statistically significant influence on analysed variables, as expressed by the following null hypothesis:

H0: An increase in ETR has a significant positive effect on the financial assets of commercial banks in the V-4 Group.

We analysed 2007–2019 to compare ETR during economic expansion and crisis. De Jonghe (2009), Kohlscheen et al. (2018), and Racicot and Théoret (2018) also analysed how ETR affects bank stability and how bank regulation impacted equity assets after the financial and debt crisis in 2008. They confirmed that ETR has a statistically significant impact on economic growth and bank stability.

According to Stavarek (2005), the common attributes of V-4 are privatisation of commercial banks, harmonisation of bank legislation with EU directives and improvement of bank regulation after the entrance into the EU. A positive benefit for all these countries was the inflow of foreign investments because they improved financial performance and made bank and insurance activities more efficient. Differences among these countries can be found in developing the bank system and providing loans to economic entities.

2.1 The characteristics of variables in the model

As dependent variables in the model, we chose bank rentability on assets (ROA), debt and equity assets, net interest income (NII), and cost-income ratio (CIR). Also, we added some other variables, such as GDP growth, STR, inflation rate and gross fixed capital formation (GFCF). We calculated ROA and ETR based on data from consolidated financial statements published by the national central banks of the individual countries. Since Czechia, Poland and Hungary values were expressed in the national currency, we converted them by ECB reference rates applied at the end of a year. We expressed ROA as a ratio of net profit to financial assets as follows:

$$ROA = \frac{\text{Net profit of commercial banks at 31.12.}}{\text{Total financial assets}} \times 100 \quad (1)$$

Debt and equity assets (million EUR) were converted by logarithm because we wanted to eliminate extreme values. These values were retrieved from consolidated financial statements for 2007–2017 as balance sheet items Debt securities, Financial instruments for sale, Financial instruments at fair value through profit or loss, and Financial instruments held to maturity. In 2018, the methodology for financial instrument presentation was changed. Since that year, debt and equity assets have been presented in more detail as items Financial assets at amortised costs, Financial assets at fair value through profit or

loss, and Financial assets at fair value through other comprehensive income.

We calculated ETR as a ratio of tax expenditure to taxable income each year:

$$\text{Effective tax rate (ETR)} = \frac{\text{Tax expense}}{\text{Taxable income}} \times 100 \quad (2)$$

Values for variables GDP growth (as a percentage change of GDP), NII (as a ratio of interest income to total assets), and CIR (as a ratio of operational costs to interest income) were retrieved from the ECB Statistical Warehouse. Data for the inflation rate (as an annual change in the price level) and GFCF were retrieved from Eurostat. We chose CIR as an additional control variable because, according to Burger and Moormann (2008), CIR represents a key indicator of bank performance.

As was mentioned above, we analysed the change in ETR and assumed that when there are changes in the economy (such as crisis, legislation, accounting standards), commercial banks will react more efficiently by changing internal processes than they can influence external factors. Gallemore et al. (2017), Brunnermeier et al. (2020), and Purina (2007) also confirmed this hypothesis. The regression model is formulated as follows:

$$\begin{aligned} \text{ETR} &= \beta_0 + \beta_1 \cdot \text{internal variables}_{it} + \\ &+ \beta_j \cdot \text{external variables}_{jt} + \varepsilon \\ \text{ETR} &= \beta_0 + \beta_1 \cdot \text{ROA} + \beta_2 \cdot \log(\text{Debt assets}) + \\ &+ \beta_3 \cdot \log(\text{Equity assets}) + \beta_4 \cdot \text{NII} + \\ &+ \beta_5 \cdot \text{CIR} + \beta_6 \cdot \text{GDP growth} + \beta_7 \cdot \text{STR} + \\ &+ \beta_8 \cdot \text{Inflation rate} + \beta_9 \cdot \text{GFCF} + \varepsilon \end{aligned} \quad (3)$$

Our study indicated a standardised root mean square of 0.1021, multiple R of 0.63, and standard error of 0.31. Thus, it seems to be a good fit model to find out the effect of ETR (Fig. 1; Tab. 2).

3. Results and discussion

Before we ran the regression analysis, we compared the development of some financial variables in the individual countries. We assumed that ETR and economic variables would have similar development within the V-4 Group (Glova et al., 2020). Fig. 2 shows the development of ETR in all countries. We can see a similar development in Czechia, Slovakia, and Poland, where ETR ranged between 15% and 25%. The lowest rate was in Czechia (above 15% on average). In Slovakia, ETR was significantly influenced by the financial crisis 2009 when it dropped from 26.56% (2009) to 16.21% (2012). Then, in 2013, it rose again (24.56%), stabilising at around 24%. Similarly, in Poland, ETR was stable until 2012. However, after 2013, ETR increased remarkably (from 18.80% to 27.78% in 2019).

The different situation was in Hungary. In 2007–2009 was, ETR development relatively the same as in the other countries (around 15%). The breakpoint for its development was the government's reaction to the financial crisis. The Hungarian government introduced new taxes for the banking sector and other economic industries, e.g., telecommunication. That led to a reduction of ETR, devaluation of the Hungarian national currency to euro

Tab. 3: Model assumption

Variable	Estimation	p-value
ROA	Positive	0.3621
Debt assets	Negative	0.2457
Equity assets	Negative	0.4772
GDP	Negative	0.1493
NII	Positive	0.2164
CIR	Negative	0.0400
NTR	Positive	0.1218
Inflation rate	Negative	0.2305
FDI	Negative	0.6943

Source: own

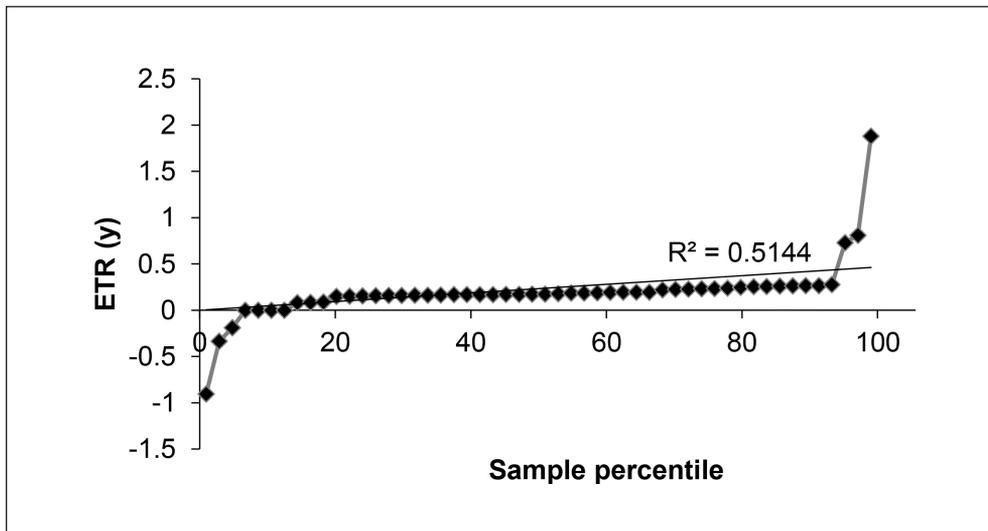


Fig. 1: Normal probability testing

Source: own

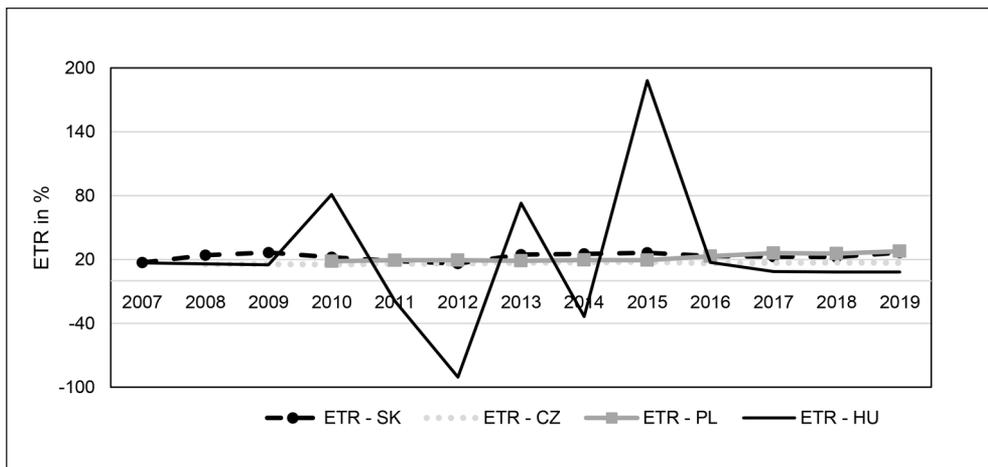


Fig. 2: The development of effective tax rate in V-4 (%), 2007–2019)

Source: own (based on ECB (2020))

by more than 30%, the outflow of foreign investors and changes in providing loans to households. Consequently, commercial banks started to have problems with higher operational costs, level of regulatory capital,

and financial performance (Valentinyi, 2012). Debt liabilities also influenced the reduction in ETR in the balance sheets of commercial banks, which rose from 2009 and then, in 2011, dropped again to the original level

(Fig. 3). The negative correlation between ETR and total liabilities was confirmed by Purina (2007) and Barjaktarović et al. (2013). In 2015, ETR significantly increased again, assumably due to the level of regulatory capital, which increased in 2012–2016 by almost 90% (from 2,160.03 million EUR to 3,869.647 million EUR; Fig. 4). The Hungarian ETR reached the highest level in 2015 (up to 188%), while in the next period 2016–2017 fell by more than 70%. Similarly, high values of ETR were found by Purina (2007) in the Russian commercial bank VTB (96.04% in 2014, 56.10% in 2015). Deutsch and Pintér (2018) confirmed a small positive impact of bank capital on the level of taxable income and a negative impact on rentability on assets. Since 2016, the Hungarian ETR has reduced by 17%, and in 2017–2019 reached the lowest level within the V-4 Group (8%). Compared to the development of macroeconomic indicators in Hungary, ETR could be influenced by the reduction in STR from 19% to a flat tax of 9% in 2017, the lowest tax rate within all EU states (Tab. 4). This reduction led to an improvement in GDP by almost 20% and a reduction of ETR in banking at 8%. Some indicators were not affected by changes in ETR, such as total tax revenues, government expenditures, gross

debt, a deficit of public finances, and inflation rate, which indicated a negative correlation.

3.1 Rentability of assets

The data for the variable ROA showed similar development as ETR (Fig. 5). The lowest value within V-4 reached Slovakia (on average 0.86%), then Poland (1.03%) and Czechia (1.20%). In Slovakia, bank rentability was strongly influenced by domestic economic development and external factors, particularly in 2009 when GDP growth decreased, and the euro replaced the national currency. Consequently, bank rentability was reduced by more than 50%. Many banks started having problems with higher credit loss costs and lower interest income. In 2010, a slight improvement was supported by the improved financial position of Slovak banks, economic growth, and preventive fiscal and monetary policy measures. In 2011–2012, ROA dropped again due to the worse ability of firms and households to repay loans. Then trend in the Slovak banking sector recorded stable development with sufficient liquidity level and minimal dependency of domestic banks on their foreign parental institutions. A more noticeable decrease in ROA appeared again

Tab. 4: ETR and nominal tax rate in non-financial firms and commercial banks in V-4 (% , 2007–2019)

	Hungary (HU)			Poland (PL)			Czech Republic (CZ)			Slovakia (SK)		
	STR	ETR nonfin	ETR banks	STR	ETR nonfin	ETR banks	STR	ETR nonfin	ETR banks	STR	ETR nonfin	ETR banks
2007	20	20	17	19	17	–	24	21	–	19	21	17
2008	20	20	16	19	17	–	21	18	16	19	20	24
2009	20	20	15	19	18	–	20	18	16	19	19	27
2010	19	19	81	19	18	18	19	17	15	19	18	22
2011	19	19	19	19	18	19	19	17	16	19	18	19
2012	19	19	91	19	18	19	19	17	16	19	16	16
2013	19	19	73	19	18	19	19	17	17	23	16	25
2014	19	19	–34	19	18	20	19	17	17	22	16	25
2015	19	19	188	19	18	19	19	17	18	22	16	26
2016	19	19	17	19	18	23	19	17	16	22	16	23
2017	9	11	9	19	18	26	19	17	17	21	17	23
2018	9	11	8	19	18	26	19	17	17	21	17	22
2019	9	11	8	19	18	28	19	17	17	21	17	27

Source: own (based on ECB (2020))

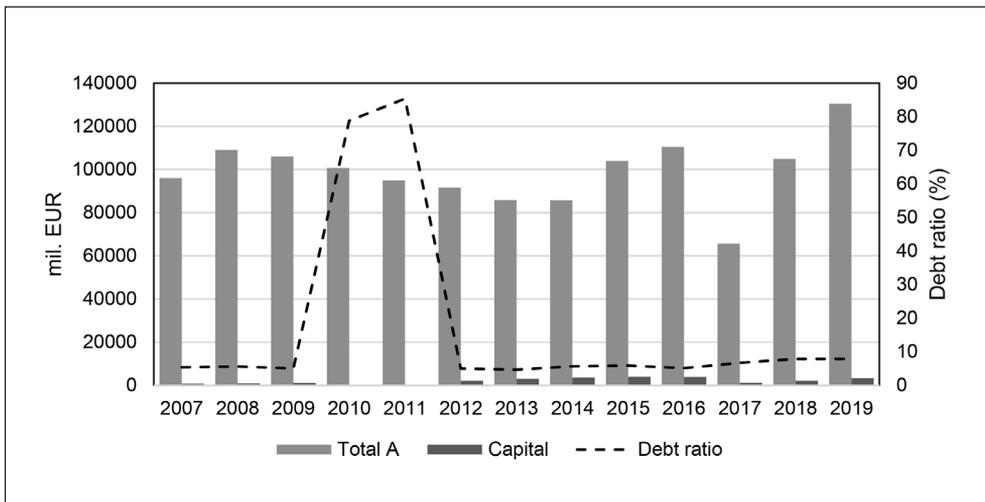


Fig. 3: The development of total assets, capital (million EUR) and debt ratio in Hungary (% , 2007–2019)

Source: own (based on ECB (2020))

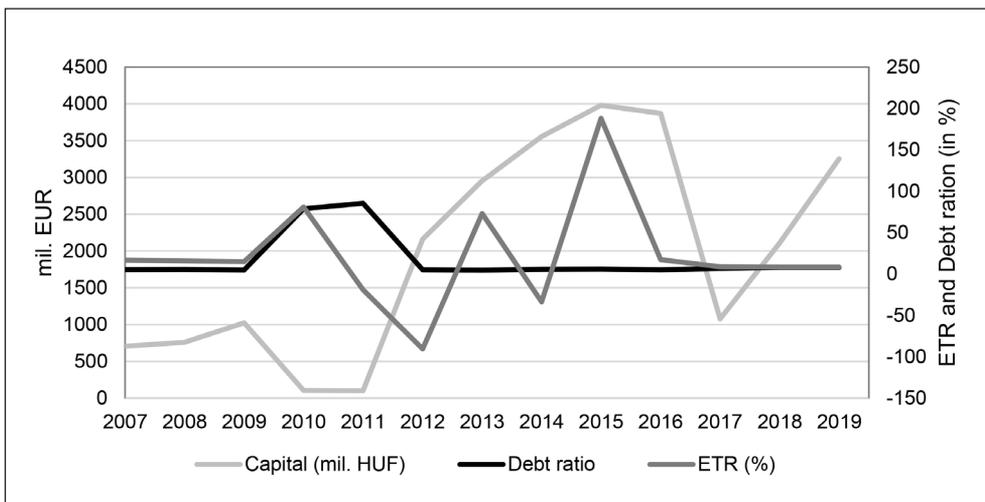


Fig. 4: The development of capital (million EUR), debt ratio and ETR in Hungary (% , 2007–2019)

Source: own (based on ECB (2020))

in 2019 because of the long-term decrease in interest margin. However, even if ROA is currently the lowest, this environment is not advantageous for foreign investments.

Despite the economic slowdown, Czech commercial banks after 2008 kept a stable position and the highest rentability of all V-4 states. The main negative factor was weakened

GDP growth, lowering interest rates on consumer loans and reducing loan repayments from private households.

Similarly, like other European states, the financial crisis jeopardised the development of Polish macroeconomic indicators. In 2008–2009, the main factors of lower rentability of Polish banks were worse quality of bank portfolio, more limited loan provision and economic slowdown. The banking sector suffered a significant reduction in income and higher costs for credit losses. Periods 2010–2012 were associated with activating economic growth and higher bank rentability. The negative factors jeopardising financial stability remained the instability of public finance, the eurozone debt crisis, and a high gross debt level. The period 2013–2014 was relatively stable for bank rentability; net interest margin increased, and the quality of financial assets improved. In 2015, financial institutions reported losses due to lowering interest margins, even though a sufficient level of regulatory capital compensated for these losses. Recently, Polish banks have continued lowering rentability because of low non-interest income, higher contribution to guarantee funds and negative interest rate spread.

In Hungary, bank rentability was influenced by the above-mentioned political factors.

In 2007–2010, ROA was at the same level as in other V-4 states (on average 0.89%), then bank rentability markedly reduced (–2.03%) and rose again at 1.47%.

3.2 Financial assets

An interesting development showed financial assets in balance sheets (Figs. 6–7). While the development of debt assets in individual countries was stable, external factors influenced equity assets. The highest level of debt assets in the analysed period was recorded in Czechia and the lowest in Slovakia. For this period, Czech commercial banks had no difficulties with debt assets or with liquidity strain because the Czech national bank realised a write-off of toxic assets of more significant financial entities. In Poland in 2014, debt assets noticeably increased (almost 21%), and their volume is still rising, meaning the highest value in all countries. This increase was influenced by credit risk and changes in the structure of balance sheet items to cover debt costs. In the case of equity assets in Slovakia, they dropped by more than 60% for a period. This dramatic decline was due to the GDP slowdown, the debt crisis in the eurozone, the low inflation rate, and worse conditions in the labour

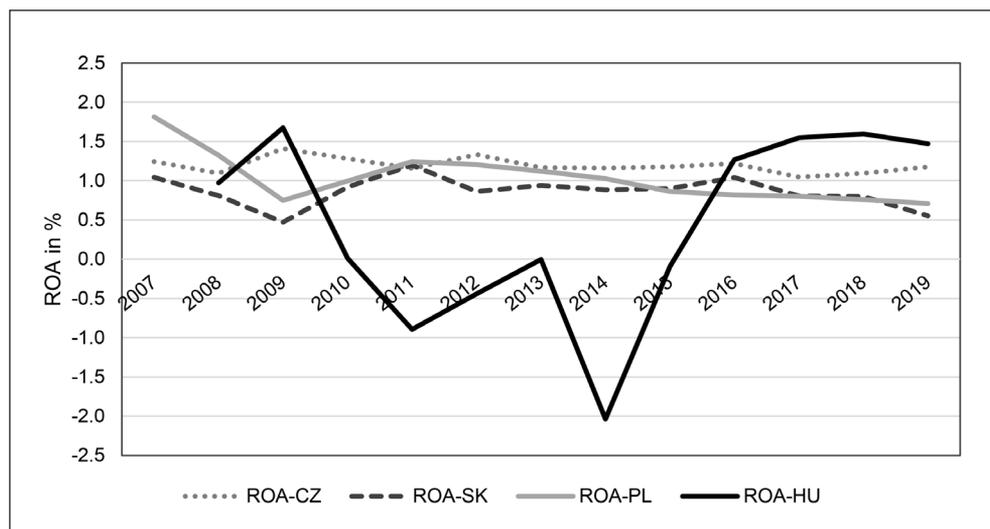


Fig. 5: The development of ROA of commercial banks in V-4 (% , 2007–2019)

Source: own (based on ECB (2020))

market in the domestic economy. In Czechia, Poland and Hungary, equity assets show an upward trend. The important risk factors in Czechia were a decline in export and industrial production, enterprises' insolvency and interest rate margin growth. Foreign investors still demanded crucial Czech financial assets from a domestic financial

stability perspective and uncertain economic conditions. Poland adopted stimulating monetary policy measures 2009 to support capital requirements, increase capital adequacy and stabilise the banking sector. External factors influencing the development of financial assets were the decision of the ECB to buy government bonds and

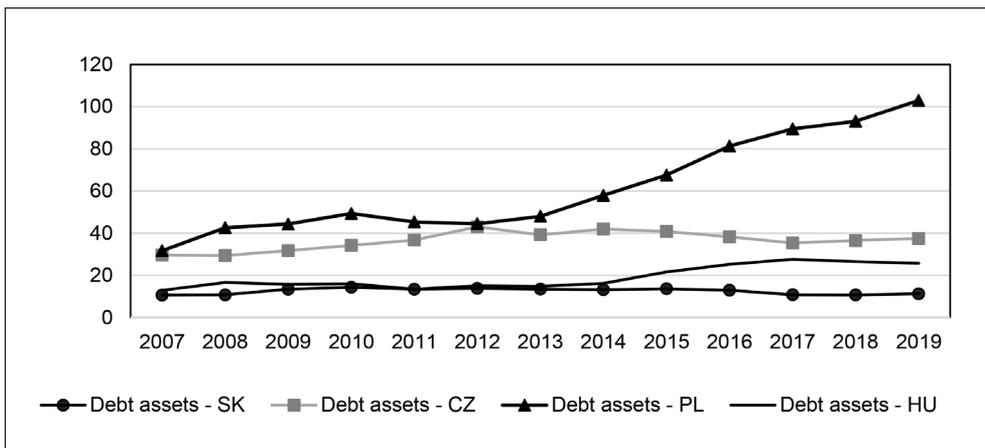


Fig. 6: The development of debt assets in V-4 (billion EUR, 2007–2019)

Source: own (based on ECB (2020))

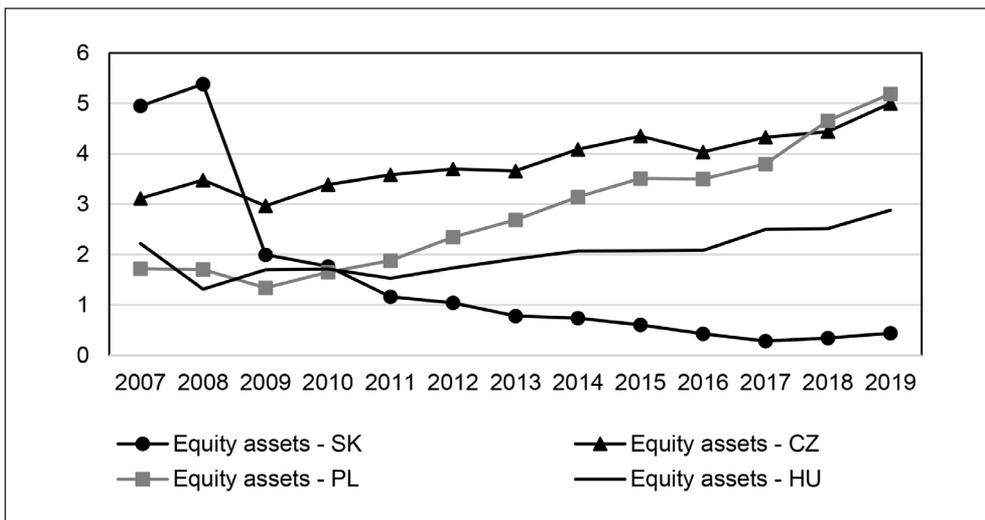


Fig. 7: The development of equity assets in V-4 (billion EUR, 2007–2019)

Source: own (based on ECB (2020))

the new accounting methodology for financial instruments, IFRS 9, adopted by commercial banks in 2018.

3.3 Discussion

We found a statistically insignificant relationship after evaluating all correlations between ETR and selected variables ($\alpha = 0.05$). The hypothesis that an increase in ETR is positively correlated with the financial assets of commercial banks was rejected. According to the results, a 1% increase in ETR would increase debt assets by about 15% in Poland and an increase in equity assets by 32%. In the case of Czechia, Slovakia and Hungary, results showed the opposite impact; thus, an increase in ETR would lead to a reduction in debt assets (7.34% in the Czech Republic, 0.64% in Slovakia, 4.55% in Hungary) and an increase in equity assets (3.01% in CZ, 1.21% in SK, 252% in HU).

ROA – ETR

Our results show a positive (8.89%) but insignificant relationship between ETR and bank rentability. Empirical studies assume a statistically significant correlation between these variables; however, they diverge on whether the correlation is positive or negative. Richardson and Lanis (2007), Liu and Cao (2007), and Armstrong et al. (2012) confirmed a positive relationship. Thus, more profitable companies achieve a higher level of ETR. The contrary argument to our assumption made by Manzon and Plesko (2001), Schandlbauer (2017), Kohlscheen et al. (2018), Gallemore et al. (2017), Mahenthiran and Kasipillai (2012) which confirmed that a higher taxable income declines level of ETR.

Debt and equity assets – ETR

Empirical research supports the hypothesis that ETR depends on the volume of financial assets. Our model showed a negative and statistically insignificant correlation between ETR and debt assets (–16.82%) and a positive correlation between ETR and equity assets (7.34%). However, studies assumed the opposite view. Thus, a higher volume of equity assets leads to a lower ETR. Studies by Chen et al. (2010) and Delgado et al. (2014) agree with our results and state that deductible debt expenses cause a negative correlation of debt assets. Feeny et al. (2005) and Wilkinson et al. (2001) consider that ETR and equity assets are

positively correlated, while Fernández-Rodríguez and Martínez-Arias (2014) did not confirm any significant relationship.

NII – ETR

The influence of ETR on NII in our model was statistically insignificant and negative (–8.02%). In the literature, evidence about this relationship is not clear. Gallemore et al. (2017) confirmed that, on average, ETR and interest income are negligibly correlated. However, they stated a positive correlation between a recession and a financial institution with a low credit rating. Gawehn (2019) assumed a positive impact, while Masiukiewicz and Dec (2012) found an inverse impact of tax rates on banks' interest income.

GPD growth – ETR

In our analysis, a change in ETR on economic growth was positive (4.56%). Generally, studies assume a positive impact of ETR on fiscal policy. However, it is not clear if this impact is positive or negative. Studies such as Claessens and Laeven (2005), Hau (2006), Baltagi et al. (2006), and Chaudhry et al. (2015) argue negligible statistical significance. Gaston and Song (2014) confirmed a significant negative impact on economic development. Gechert and Heimberger (2022) conclude that the ambiguous effect of corporate taxes on economic growth depends on several factors, such as methodology choice, econometric methods, periods, data sets, or economic theory.

Cost-income ratio – ETR

Analysing the correlation between ETR and cost-income ratio, we found a small negative impact (–1.09%). In contrast to our results are findings by Burger and Moormann (2008), Slemrod (2004), Hanlon and Heitzman (2010), and Fiordelisi et al. (2011). They stated a significant positive correlation between these variables. Thus, if ETR declines, companies report lower operational costs in their profit and loss statements. On the other hand, Richardson and Lanis (2007), Nicodème (2002), Gilson and Schizer (2003), and Shevlin et al. (2017) presumed that a higher ETR in one country would lead to capital transfers in another one with a lower effective rate to optimise costs.

Statutory tax rate – ETR

We obtained evidence that the correlation between ETR and STR was insignificant and

positive (3.51%), which corresponds with findings by Claessens and Laeven (2005) and Gaston and Song (2014). Authors Dias and Reis (2018), Andrejovska (2019), and Inkabova et al. (2021) analysed differences between these rates and proved that the higher the STR, the smaller the increase in ETR. Vella (2015) pointed out that significant differences between tax rates lead to speculative optimising strategies and, thus, excessive tax evasion in a country. Fernández-Rodríguez

et al. (2021) find that STR has no effect on ETR in emerging economies.

Inflation rate – ETR

Our results showed that an increase in ETR will lead to a decline in the inflation rate (–3.38%). This conclusion contrasts Spengel et al. (2016) and Immervoll (2000). They stated an insignificant positive correlation that depends on other economic factors (e.g., economic recession, expansion, or tax system).

Tab. 5: Effect of ETR in Slovakia (2007–2019)

Slovakia	Coefficients	St. error	t-stat	p-value
ROA	-14.7381	6.2070	-2.3744	0.0981
log Debt assets	-0.6940	19.7163	-0.0352	0.9741
log Equity assets	1.2078	4.3014	0.2808	0.7971
NII	1.1950	5.7588	0.2075	0.8489
CIR	0.1416	0.2002	0.7073	0.5304
log GDP	12.7608	24.1246	0.5290	0.6335
NTR	1.2197	1.0354	1.1780	0.3237
Inflation rate	-0.8881	1.0192	-0.8713	0.4477
GFCF	0.6999	0.9810	0.7135	0.5270

Note: $N = 13$; $R^2 = 0.8348$; adj. $R = -0.3393$; st. error = 2.8171; SS = 120.33; MS = 13.37; F -test = 1.6848; p -value = 0.3652.

Source: own

Tab. 6: Effect of ETR in Czechia (2007–2019)

Czechia	Coefficients	St. error	t-stat	p-value
ROA	-1.221	11.858	-0.103	0.925
log Debt assets	-7.345	20.437	-0.359	0.743
log Equity assets	3.001	27.541	0.109	0.920
NII	-1.945	2.669	-0.729	0.519
CIR	0.124	0.224	0.552	0.619
log GDP	-1.148	25.890	-0.044	0.967
NTR	-3.833	1.359	-2.820	0.067
Inflation rate	0.234	0.751	0.311	0.776
GFCF	0.298	2.008	0.149	0.891

Note: $N = 13$; $R^2 = 0.9358$; adj. $R = 0.7435$; st. error = 1.3449; SS = 240.76; MS = 26.75; F -test = 4.8650; p -value = 0.1099.

Source: own

Tab. 7: Effect of ETR in Poland (2007–2019)

Poland	Coefficients	St. error	t-stat	p-value
ROA	25.4780	5.5743	4.5706	0.0196
log Debt assets	15.4020	6.7089	2.2958	0.1054
log Equity assets	-32.2722	8.7335	-3.6952	0.0344
NII	-1.6550	2.0001	-0.8275	0.4686
CIR	0.5662	0.2007	2.8213	0.0667
log GDP	103.4366	21.7048	4.7656	0.0175
NTR	0.0030	0.0063	0.4794	0.6486
Inflation rate	-2.8131	0.5684	-4.9492	N/A
GFCF	-0.5317	0.7245	-0.7339	0.5161

Note: $N = 13$; $R^2 = 0.9943$; adj. $R = 0.9773$; st. error = 1.5055; SS = 1,195.98; MS = 132.88; F -test = 58.6294; p -value = 0.0032.

Source: own

Gross fixed investments – ETR

In the case of a relationship between ETR and fixed investments, we found out small negative correlation (-0.98%). Alves (2018) confirmed a negative correlation between ETR and investment dynamics from a short-term and long-term perspective. Our result corresponds to a study by Goda and Ballesteros (2020) and Farah et al. (2021), which confirmed that there is not any significant correlation between these variables.

Foreign direct investments and the openness of an economy rather explain this correlation.

As we see in Tab. 5, in Slovakia was found a negative impact of ETR on ROA (-14.74%) and inflation rate (-0.89%) and a positive impact on NII (1.20%), cost-income ratio (0.14%), GDP growth (12.76%), statutory rate (1.22%) and fixed investments (0.70%).

As can be seen in Tab. 6, in Czechia was confirmed a stronger negative impact of ETR

Tab. 8: Effect of ETR in Hungary (2007–2019)

Hungary	Coefficients	St. error	t-stat	p-value
ROA	36.8894	40.3552	0.9141	0.4281
log Debt assets	-454.9896	471.9460	-0.9641	0.4061
log Equity assets	252.7688	283.3013	0.8922	0.4380
NII	-66.9480	50.9181	-1.3148	0.2800
CIR	-9.2458	4.8614	-1.9019	0.1533
log GDP	-503.2355	520.8111	-0.9663	0.4052
NTR	-5.5322	15.3774	-0.3598	0.7429
Inflation rate	-11.2036	18.1952	-0.6157	0.5816
GFCF	1.8061	17.9934	0.1004	0.9264

Note: $N = 13$; $R^2 = 0.7122$; adj. $R = -0.1510$; st. error = 70.4634; SS = 36,867.11; MS = 4,096.34; F -test = 0.8250; p -value = 0.6398.

Source: own

on rentability (−1.22%), NII (−1.94%), statutory rate (−3.83%) and GDP growth (−1.15%). The negligible positive effects of the increase in ETR by 1% were on the cost-income ratio (0.12%), inflation rate (0.23%) and fixed investments (0.30%).

The analysis showed a statistically significant correlation in Poland (Tab. 7). Thus, a 1% increase in ETR would lead to an increase in rentability (25.50%), cost-income ratio (0.57%) and GDP growth (up to 103%). A negative trend was observed in NII (−1.65%), inflation rate (−2.81%) and fixed investments (−0.53%), while the statutory rate had a negligible impact.

In Hungary, the results were strongly affected by wide variations of ETR due to political choices (Tab. 8). According to data, an increase in ETR would have a strong negative impact on all factors except rentability (36.89%) and fixed investments (1.81%).

The individual analysis of regression coefficients showed a negative impact of ETR increase on debt assets, interest income and cost-income ratio, and an inverse relationship between ETR and inflation rate and fixed investments. The positive impact did have a change of ETR on bank rentability on assets, equity assets, and statutory rate and GDP growth (Tab. 9).

Tab. 9: Individual effects of ETR in V-4 Group (2007–2019)

Individual effects	Coefficients	St. error	t-stat	p-value
ROA	8.8956	9.6536	0.9215	0.3621
log Debt assets	−16.8271	14.2920	−1.1774	0.2457
log Equity assets	7.3354	10.2280	0.7172	0.4772
NII	−8.0236	6.3937	−1.2549	0.2164
CIR	−1.0883	0.5136	−2.1192	0.0400
log GDP	4.5635	3.1070	1.4688	0.1493
NTR	3.5084	2.2218	1.5791	0.1218
Inflation rate	−3.3765	2.7751	−1.2167	0.2305
GFCF	−0.9875	2.4953	−0.3957	0.6943

Note: $N = 52$; $R^2 = 0.1868$; adj. $R = -0.0126$; st. error = 32.3150; SS = 10,078.23; MS = 1,119.80; F -test = 1.0723; p -value = 0.4025.

Source: own

Conclusions

The study dealt with the effective tax rate in commercial banks in the V-4 Group. The banking sector in these countries in 2007–2019 was characterised by some common attributes, e.g., strong correlation with macroeconomic development in the EU, reaction to the financial crisis, and stability in the financial market. The differences were seen in the political situation in Hungary (excessive bank taxation, devaluation of the national currency, drop in bank rentability, reduction of the statutory rate at 9%).

Our assumption that an increase in ETR would lead to an increase in financial assets

was not confirmed. Therefore, we rejected the null hypothesis. Results of the regression analysis showed that, in general, an increase in ETR by 1% leads to an increase in equity assets by 7.34% and a reduction of debt assets by 16.83%. However, the results were not statistically significant. For individual countries, results were significant only in Poland, where a 1% change in ETR would increase debt assets by 15.4% and a reduction in equity assets by 32.27%. On the other hand, in Czechia, Slovakia and Hungary, statistically insignificant results proved only the assumption about the negative impact of ETR on debt assets

(7.34% in CZ, 454% in HU, 0.69% in SK) and positive impact on capital assets (3.01% CZ, 252% HU, 1.21% SK). The observation suggests a stronger positive impact of ETR on rentability and equity assets, on the other hand, a negative effect on debt assets, net interest income and cost income ratio.

We suggest that special emphasis should be placed on the relationships between ETR and all items of financial assets in the balance sheets of commercial banks in all EU Member States. It should consider the period before 2017 with the present period to determine the effect of the new international accounting standard for financial instruments on taxable income and tax expenditure. Our research necessitates improving the methodology used. We want to examine ETR in the EU by cluster analysis to determine groups of European banks according to the structure of assets and liabilities and to compare them from an investment decision perspective. Furthermore, we would like to use difference-in-difference analysis to determine the effect of ETR and accounting standards on commercial banks' balance sheets.

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