

THE ROLE OF START-UP COMPANIES IN THE ECONOMIC GROWTH AND THE ASSISTANCE OF TAX POLICY

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Abstract. The demand for economic restructuring and the challenges presented by the 4th stage of the Industrial Revolution resonated within the entire global economy. Start-up companies play an important role in this stage as carriers of revolutionary technologies and innovations, which may influence the growth of labour productivity and economic growth. In carrying out their activities, start-up companies may face a lack of capital, which significantly limits their growth. The state's tax policy also plays an important role here. The aim of our paper is to examine the effects of a country's tax policy. Emphasis is placed on corporate tax, the amount of which plays an important stimulating role in the start-up business activities. Based on previous research, which signals a lack of capital in start-up companies and the impossibility of entering the capital market, tax policy can play an important role. This paper intends to quantify these relationships, using a linear regression analysis. The main outcome of the research, based on the analysed data, indicates that a decline in corporate tax rate is associated with a higher growth rate of GDP per capita compared to a period when there was no decline in this tax rate. The subject of our interest is countries with a small size of economy, which are placed in the ranking of states in comparison with developed countries with a large economic size in the leading positions. This group includes Estonia, Finland, Ireland, and Hungary. Current practice in these countries suggests that start-up companies have strong support for the state's tax policy.

Keywords: Venture capital, start-up company, corporate income, tax policy, economic growth

JEL Classification: G11, G12, G15

Introduction

The beginning of the 4th stage of the Industrial Revolution - Industry 4.0, which is defined by the processes of digitization and robotization, significantly contributed to the changes in the global economy in recent years. The view of the business environment and the role of individual entities in the implementation of economic policy is also changing.

The current situation in global markets associated with the COVID-19 pandemic is connected to a huge decline in gross domestic product and uncertainty in stock markets as well. The problem of restructuring individual economies, as well as the entire global economy, comes to the forefront, and companies that bear significant innovations in the economy, start-up companies, should play a decisive role in this process. The ranking of individual states as bearers of revolutionary technologies proves that even countries with small economic size have a great chance to become major players in this field through start-up companies. The following table lists the top five countries in the ranking of countries in the world, together with the position of the countries of our interest.

The ranking below shows, that the most efficient in this area are economies with a large economic dimension. Given that our intention is to focus mainly on countries with a small economic space within Europe, such as Hungary, Estonia, Ireland, and Finland, we can state that these countries have achieved excellent ratings and may experience bright future economic development.

Tab.1: Start-up companies - ranking of countries in 2023

Country	Number of start-up companies
1. United States	77,553
2. India	17,228
3. United Kingdom	7,046
4. Canada	3,891
5. Australia	2,903
Finland	469
Ireland	465
Hungary	310
Estonia	271

Source: www.startupranking.com

1. Literature review

In the last decade, various approaches to the researched issue have appeared in scientific articles. These articles focus on an in-depth analysis of Industry 4.0 and its components, where start-up companies play an important role, in the current problems of economic growth and business caused by the onset of the COVID-19 pandemic. A geopolitical factor such as the war in Ukraine may also play a negative role.

Authors Desmet and Parente (2012), as well as Popov (2014), explained the above-mentioned connections in a theoretical form, they followed the previous stages and

generally characterized the onset of the 4th stage of the Industrial Revolution as a transition to modern economic growth when companies implement technologies that reduce production costs. The need to respond to these processes is pointed out by the authors Crnjac et al. (2017), who analyzed the individual implementation strategies within the economy in greater detail.

While in the past the crucial position within individual economies, but also around the world was played mainly by large companies with a great volume of large-scale production, especially tangible goods, today often small companies with revolutionary technologies play a significant role in economic growth. Nowadays, unique forms of services and products that are "tailored" to the consumer are in demand. Many authors have pointed out these new tendencies in previous years. Looking to the future and solving the problems of macroeconomic structural changes are addressed in an article by Yevsikov et al. (2017), who pointed out that the economic recovery after 2008 in the US and Europe is very low and one of the reasons is the structural and economic crisis in the global economy. The stock market also reacted to these processes in this decade, signaling its composition changes in the sectoral structure and drawing attention to the need for economic restructuring. The authors Qamruzzaman and Wei (2018), who in their article looked for a long-term link between financial innovation and economic growth, have already reacted in advance to this connection. However, the development so far has proved that the real economy lags significantly behind the development of the stock market. Other studies like Swinkels et al. (2017) also pointed this out.

There is a high risk associated with the emergence of these entities, which is why they are perceived in economic theory as part of venture capital. Particularly risky are the first stages of the development of this capital, where start-up capital is needed, and the desired effect does not always manifest itself. At this stage of their development, start-up companies have limited access to financial resources because they lack a business history and the distrust of the financial sector is also reflected in the approach of financial institutions to lending. On the other hand, the aspect is often emphasized that in the absence of such support, especially from private investors, the so-called business angels, who often take a huge risk, there would be no world-famous companies like Apple, Microsoft, Facebook, or Intel today. As Allen and Hall (2007) stated, the managers of such companies play an important role, they need to make decisions and be well-informed about the possibility of obtaining various resources. Similar research was conducted by Dessi (2005), who looked for a link between the business community and venture capital investors. Rostoka et al. (2019) responded to the need for effective cooperation within individual branches with university workplaces. They specifically analyze these relationships in the field of construction.

In the next phases, there is a need for funds for their further development and expansion of production, where the state can also make a significant contribution to their support through its tax policy. It is very important for companies of this type to be able to reinvest a substantial part of their profits in their company. This was also pointed out by the authors Gale and Brown (2013), who examined in their article how a wide range of tax policies affect business activity and what targeted incentives could exist for young companies without a long history.

In the current global economy, the majority of start-up companies and related technological innovations have been realized mainly by the most advanced and largest economies in the world, such as the USA, Japan, Great Britain, and in recent years China. A new phenomenon is currently the integration of economies with little economic space into these processes. From a short-term view of the business environment of countries such

as Ireland, Finland, Estonia, or Hungary, it indicates a growing trend of such companies, where not only private capital but also the state with its tax policy plays an important role in their development. Wielen (2020) drew attention to the impact of tax policy. High capital mobility may cause a loss of motivation for some countries to reduce corporate tax rates in an effort to attract foreign investors. Moreover, due to the existence of 28 different tax systems within the European Union, companies may be motivated to take advantage of the diversity of tax systems and shift their profits to jurisdictions with lower tax burdens. An obstacle to the introduction of tax harmonization may be the reluctance of countries to relinquish sovereignty over tax policy and fiscal autonomy. According to Radaelli (2013), the European Union currently faces a political dilemma, where it has to choose whether to avoid the centralization of the tax policy of the European Union countries or to avoid the undesirable consequences of unlimited tax competition between the countries of the European Union. However, according to Sorensen (2004), the preferences of countries after tax harmonization may vary depending on the size of the economy.

2. Aim and methodology

The paper focuses on finding and analyzing connections between three economic categories, namely start-up companies, tax policy, and economic growth. The aim is to examine the effects of the state tax policy with an emphasis on corporate tax, the amount of which plays an important stimulating function within the business activity of a start-up company. The aim of the article is also to demonstrate the interconnection between tax policy, the economic growth of the country, and support for the creation of start-up companies with a focus on its individual components. We focus mainly on relatively small open economies, such as Finland, Estonia, Ireland, and Hungary which due to their tax instruments, have significantly supported the creation of new start-up companies and are among the leading countries in European countries. In terms of time, the research focuses on the time horizon from 2000 until now. Our research will be based on the hypothesis that is key to solving the above relationships.

Solving this problem is based on the following hypotheses.

- H1. A change in the amount of a corporate tax may stimulate the economic growth of a country*
- H2. The amount of invested capital in start-up companies has a growing trend, which is supported by selected tax instruments*

To solve these issues, in addition to the classic methods of investigation, the paper relies on linear regression and correlation analysis methods as the key methods for the analysis. The aforementioned methods mathematically describe the statistical dependence between the quantitative statistical variables examined, such as the development of the stock market and the real economy in terms of structural changes within the sector. The task of regression analysis is to find a functional relationship according to which the dependent variable changes with the change of the independent variable. Its result should be a suitable regression function along with an estimate of its parameters. The mathematical expression of this causal dependence using a linear regression model has the following form:

$$y_j' = b_0 + b_1 x_j$$

$$b_0 = \frac{\sum_{i=1}^n x_i^2 \sum_{i=1}^n y_i - \sum_{i=1}^n x_i \sum_{i=1}^n x_i y_i}{n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$

$$b_1 = \frac{n \sum_{i=1}^n x_i y_i - \sum_{i=1}^n x_i \sum_{i=1}^n y_i}{n \sum_{i=1}^n x_i^2 - (\sum_{i=1}^n x_i)^2}$$

$$i_{yx} = \sqrt{\frac{\sum_{i=1}^n (y_i' - \bar{y})}{\sum_{i=1}^n (y_i - \bar{y})}}$$

$$i^2 = 1 - \frac{\sum_{i=1}^n (y_i - y_i')}{\sum_{i=1}^n (y_i - \bar{y})}$$

where:

y_j'	theoretical values of the dependent variable,
y_j	values of the dependant variable,
x_j	values of the independent variable,
b_0	slope,
b_1	intercept,
i_{yx}	index of correlation,
i^2	index of determination,
n	number of values,
i	the order of values,
$\bar{y}$	the arithmetic means of y values.

The most frequent method of estimating regression functions for linear correlation is the least-squares regression based on empirical data for the dependent variable (y_i). To obtain a regression line and consequently its parameters, it is critical that the sum of squares of the deviations of the empirical values from the theoretical ones is minimal. The obtained parameter b_0 from the regression line as the slope determines the point where the line crosses the axis and determines the value of the dependent variable while the independent variable is 0. The second parameter b_1 is intercept which indicates how much the dependent variable changes when changing the independent variable. Subsequently, the statistical significance of the acquired parameters b_0 and b_1 by Student t-test for a given confidential level is tested. At the linear dependence, there is also a determined value of the correlation coefficient, which expresses the strength of dependence between the investigated variables. The square of the correlation coefficient is the determination coefficient, which in turn determines what portion of the variability of the dependent variable is explained by the selected regression line. In determining the correlation strength in the analysis, we use the interpretation set by Cohen (1988).

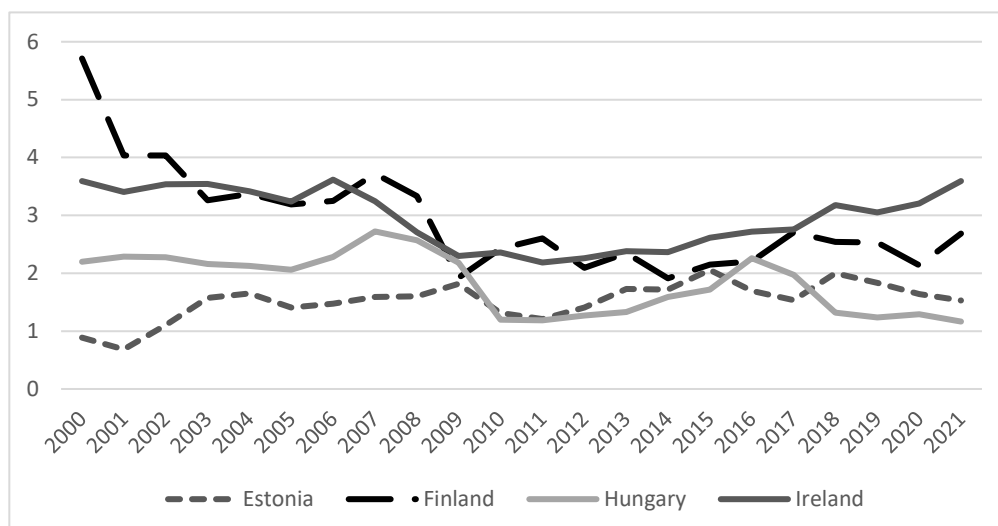
When processing quantitative indicators for individual countries, we mainly used OECD databases. These were basic macroeconomic variables, as well as a set of variables aimed at identifying the status of corporate income tax in the surveyed countries. The additional database of statistical data consists of quantities obtained from the central tax offices of individual countries. Selected data focused on the position of corporate tax in the tax system were used from Eurostat statistical sources for the period of 2000 to 2020.

3. Results and Discussion

During recent years, we have seen a long-term declining trend in the area of corporate tax rates in the EU or OECD countries. This process can be traced back to the second half of the 1980s and especially in the 1990s, after the liberalization of capital markets. Since 1996, average corporate tax rates in the EU have fallen from 35% to 21.3% in 2018. Several experts, such as Overech and Rincke (2011) and Devereux and Loretz (2012) addressed the question of whether the cause of the fall in tax rates is the effort of individual governments to attract foreign investors through low tax rates. According to Devereux and Loretz (2012), this declining trend is almost entirely explained through tax competition between countries in the context of capital mobility. Such a trend reinforces concerns about the so-called „Race to the Bottom“, which can lead to disruptions in tax revenues. Despite a clear long-term decline in tax rates in the EU, corporate tax revenues remain relatively stable. The structure of the tax system is specific to each country, and the factors that affect the system are mainly historical, social, and economic. As a result of the harmonization of tax systems in the European Union, the tax system of each country is constantly changing, currently with particular emphasis on reducing the volume of tax evasion. The application of tax instruments (especially tax reliefs for start-ups) in different economies, can thus bring different economic results. From our point of view, the purpose of tax collection should not only be the generation of income for the country. Given the costs associated with tax administration, it is essential that taxes create a sustainable business environment. According to Devereux (2006), competition through the corporate tax rate significantly affects national tax policies by the use of their tax instruments.

In Europe, the decline in corporate tax rates is not reflected in the share of this tax in the GDP. The motivation to reduce the corporate income tax rate is mainly related to positive economic development. In addition, empirical studies provide evidence, that the reduction in the corporate tax rate is compensated by a broadening of the corporate tax base in the form of reduced credit rebates, fewer loss relief rules, and restrictions on the interest deductibility, depreciation, and specific conditions for start-ups. A reduction in the tax rate, therefore, leads to a reduction in tax revenues, but the effect is not negative in the medium to long term, as a low tax rate encourages investment. The share of corporate tax as % of GDP is shown in Fig. 1.

Fig. 1: Share of corporate tax on GDP (%)



Source: author's calculation based on OECD data.

The tax system can serve the state as a tool with which it can influence employment, the inflow of investors into the country, and therefore job creation, etc. In today's process of economic globalization, which helps the free cross-border movement of goods, services, capital, and labor, it is precisely the economic policies of individual states that should try to converge and create a unified business environment, especially within the EU. This brings the question: How to tax the economic entities or their business activities? If the state does not address important tax issues and their impact on the economy, it creates barriers to the enforcement of a common EU tax policy and the creation of the EU single market. Although states aim to follow certain principles, their tax systems have many differences. According to the Treaty on European Union, the EU member states are sovereign states and it is in their competence and responsibility to determine their own tax rates, propose adjustments to the tax base, specify depreciation policies, or create preferential tax regimes for start-up companies in the country. Each country therefore creates its own support system for the startup environment to attract foreign investors, which gives stimulus for the development of its economy, gives job opportunities to a large number of highly qualified people, helps GDP growth, and the development of new technologies. European startups are at a significant disadvantage compared to the ones from the US, which have access to developed capital and an integrated internal market. In Europe, there is still a trend where both individual and institutional investors tend to focus primarily on their home markets and thus often do not seek investment opportunities within the single European market.

3.1. Hungary

The Hungarian economy experienced dynamic economic growth from the beginning of the 21st century until the impact of the global economic crisis. After minor cyclical fluctuations, Hungary's economy restarted in 2013. Since this period, the overall performance of the economy has recorded continuous growth, mainly due to the influence

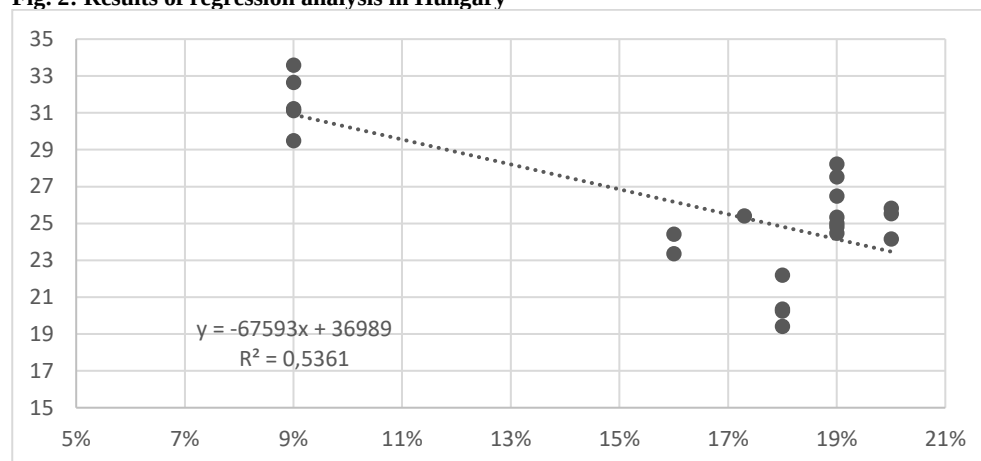
of the automotive industry. Every company doing business in Hungary is a corporate taxpayer, and Hungary is the only V4 country that allows group taxation of companies.

Hungary is very attractive from the point of view of investment as well as the creation of new companies. Companies are taxed at the lowest corporate tax rate of 9% in the EU. At the same time, Hungary offers companies a wide range of tax credits and incentives (mainly focused on development and investment). Corporate income tax rates of 9% have been applied in Hungary since 2017. The corporate income tax rate has changed several times in Hungary and, as the regression results also declare, its impact on the development of the Hungarian economy is significant (in 2004 the tax rate was 16%, in 2010 it was 19%, in the period from 2012 to 2019 a small business income tax of 13% was also applied).

High inflation and a high budget deficit in the period from 2020 to 2021 were the main factors that forced the Hungarian government to intervene in the tax system. In 2022, the Hungarian government introduced several extraordinary taxes on selected types of companies. Extraordinary taxes were introduced for the banking sector, drug distributors and manufacturers, and oil companies. Specific taxation also affected companies that are energy suppliers.

Energy producers and distribution system operators are subject to a tax rate of 41%. The extraordinary tax on the profit of producers of petroleum products is 25%. Another area taxed at 20% is companies - drug distributors. The significant increase in the efficiency of the tax system has also been supported in the last 8 years by significant electrification of the market with the aim of simplifying communication with the tax administrator, together with simplifying the registration of new companies. Fig. 2 represents the results of a regression analysis, where changes in GDP per capita are affected partly by changes in the corporate tax rate.

Fig. 2: Results of regression analysis in Hungary



Source: author's calculation based on OECD data.

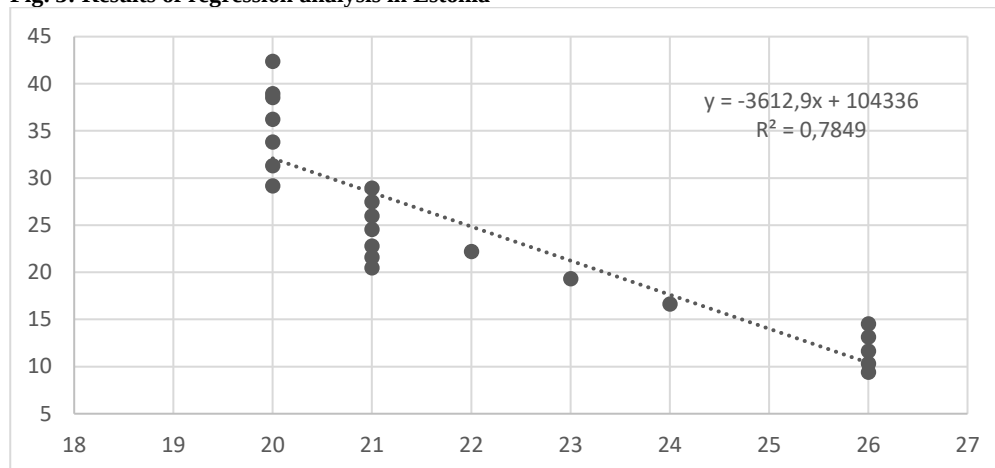
3.2. Estonia

Estonia is one of the fastest growing economies not only in the Baltics but also in Eastern Europe. Its economy is based mainly on services, information technology, telecommunications, shipbuilding and banking. According to the Estonian government, tax

measures are intended to contribute to social equality, faster economic dynamism and greater support for the business environment, including support for start-up companies.

It was the first of the Baltic republics to introduce a uniform corporate tax rate in its tax system. The total tax burden in Estonia decreased by more than 5% of GDP between 1995 and 2000. The increase between 2007 and 2009 is largely explained by the accumulated effects of several years of a fast-growing economy. Since 2010, the total tax burden ranges from 31% to 33%.

Fig. 3: Results of regression analysis in Estonia



Source: author's calculation based on OECD data.

As Fig. 3 shows, up to 78% of the change in GDP could be due to a change in the corporate tax rate in Estonia. At the same time, the distance of individual points from the trend linear line demonstrates the strongest dependence between the variables among all the studied countries. The corporate tax system was reformed in 2000 to provide more funding for investment and to support economic growth. The basic idea of the reform was to postpone corporate taxation until the distribution of profits. In Estonia, all retained earnings of companies are exempt from corporate tax. The taxation of corporate profits is postponed until the profits are distributed as dividends or treated as distributed, for example in the case of adjustments to transfer prices, expenses, and payments that have no business purpose, marginal benefits, gifts and representation. Distributed profits have generally been taxed at the rate of about 20%.

Since 2018, a lower corporate tax rate of 14% has been applied to companies that regularly distribute profits. Income tax is calculated based on the average payout for the last 3 years - that is, the percentage of income tax for average dividends for the previous 3 years is 14% and for anything above the average is 20%. One of the reasons for the rising GDP in the country, despite the declining corporate tax rate, may be the lower rate that stimulated the creation of new businesses, which ultimately increased GDP. We can see the country's GDP rising steadily despite the declining corporate tax rate. This can be the impulse for the creation of new businesses and corporate companies.

There are currently 550 startups and several incubators and accelerators in Estonia (2019) and the country is expected to reach 1,000 startups in 2020. The government initiative Startup Estonia should also help in this goal. In 2018, 20 top startups in this country created up to 62% of new jobs, and according to a survey by Keskus "Required Employer

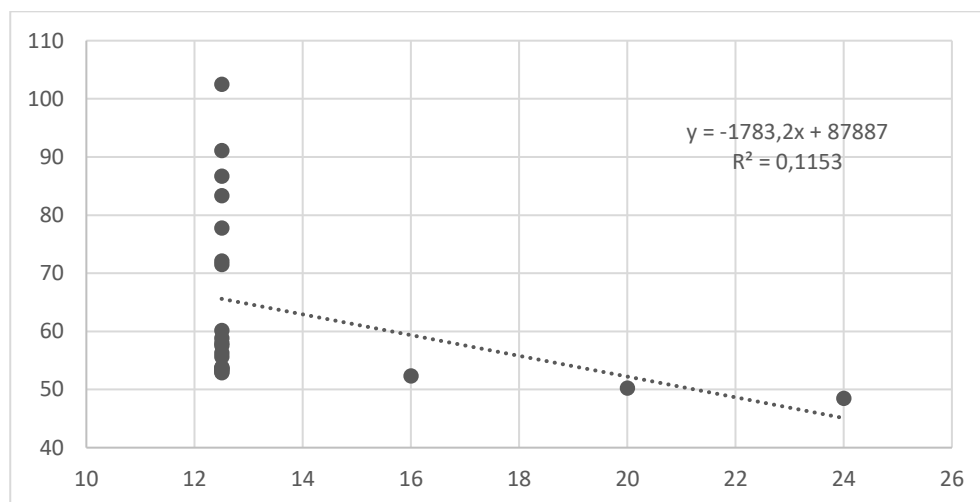
Survey of 2019", Estonian startups are among the best companies that people would like to work for. In 2018, the startups generated an annual turnover of more than 299 million euros, which is 9% more than in 2017.

3.3. Ireland

The tax system in Ireland is considered to be very simple and clear. The foundations of the current Irish tax system were reformed in 1987. The aim of economic reform was to drastically reduce and subsequently eliminate high government deficits, reduce taxes on profits in industrial production and other downstream sectors, and with the help of trade unions, moderate wage growth throughout the economy. This reform helped the country to improve its macroeconomic environment and turned Ireland into a "Celtic tiger". It was one of the country's most remarkable economic successes in the world, with a long-term tax modification plan being a key element of the Irish reform.

Major changes in the tax system at the end of the 1990s also concerned the area of corporate income tax, which was characterized by various tax breaks and a low ratio of collected income taxes to GDP in the time before reform. Initially, the corporate tax rate was reduced from the original 50% to 43%, but the plan to gradually reduce the basic corporate tax rate stabilized at 12.5% in 2003. This decline was supported by a massive inflow of foreign investment and growth in the business sector. In 1994, the inflow of foreign direct investment into Ireland amounted to almost 83 million dollars, and in 2002 this amount exceeded the amount of 20 billion dollars. The vast majority of investments were concentrated in the information technology, electronics, chemical, and pharmaceutical industries. Global electronics manufacturers and information service providers have also settled in Ireland. Corporate income tax is one of the direct income taxes taxing the income of capital and other legal entities. It is one of the symbols of Ireland's economic successes in recent years. Ireland is one of the European countries with the lowest tax rates in the European Union, which is a great attraction for foreign investors.

Fig. 4: Results of regression analysis in Ireland



Source: author's calculation based on OECD data.

Fig. 4 shows the results of a regression analysis in Ireland, where changes in GDP per capita are least affected by changes in the corporate tax rate, which may also be because the corporate tax rate has not changed for 16 years.

The distance of individual points from the trend linear line is relatively big which proves the weakest dependence between the variables among all the studied countries.

There are two corporate tax rates in the Irish tax system. 12.5% rate is the standard tax rate and is applied to trading income. The increased 25% rate is applied to non-business income, the passive income. The tax base is calculated in the standard way, meaning tax deductible costs are deducted from income. In contrast to Slovakia, where deductible items are used to reduce the tax base, in Ireland there are so-called capital allowances, which do not include items of capital expenditure spent on purchasing or maintaining properties, plants, and equipment. The company may apply for capital relief on expenses, which arise in connection with business assets and are considered an expense in calculating the profit of a company.

Since 2004, Ireland has been providing start-up companies with tax credits for research and development. Its aim is to stimulate both foreign and domestic companies to do new or additional research and development activities inside the country. The research and development tax credit are available to companies and branches resident in Ireland at internal costs. Eligible expenses include both income and capital expenditure. In practice, eligible expenses mean labor costs, overhead costs, buildings, or machinery. In 2009, a new incentive was introduced for expenses spent on acquiring intangible assets. The exemption from tax applies to acquired assets, which were bought in May 2009, by deducting tax depreciation. It allows capital expenditures to be depreciated over a specified period of 15 years or over a period of use for accounting purposes.

As we have mentioned several times, Ireland is attractive for investors due to its favorable corporate tax. It has, therefore, set up an investment promotion agency called IDA Ireland. It is a non-commercial organization supporting foreign direct investments in the country through a wide range of services. They work with potential and existing investors to help them create or expand their activities, and they constantly develop strategies to attract new investors.

3.4. Finland

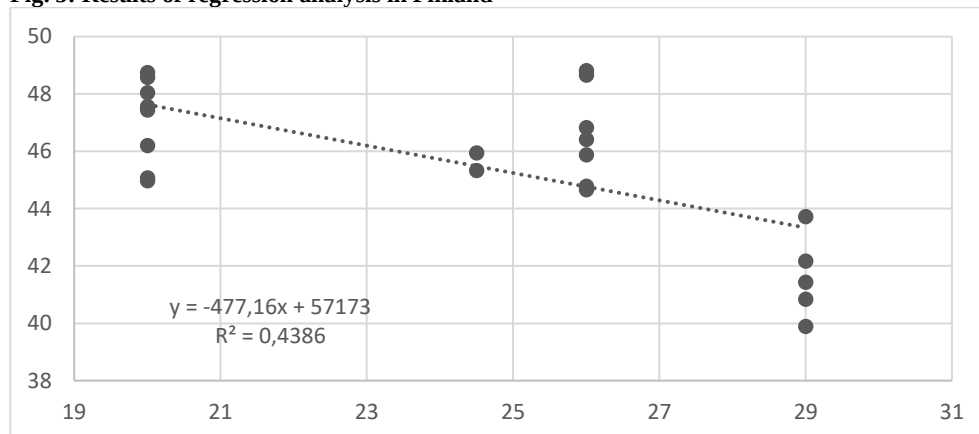
The economy of Finland is at the forefront of the world's competitiveness rankings. It is currently in the process of recovering. In the first quarter of 2017, economic growth reached 3%. This growth is due to consumption in the private sector, investment, revival of construction, and commercial construction. Finland was also closely economically linked to the Soviet Union in terms of security policy. When the Soviet Union disintegrated, Finland and its economy suffered heavy losses. A reform has taken place where the government has focused on more rigorous regulation of public finances, limiting government spending, and abolishing double taxation of dividends in the area of taxation. This has resulted in a significant increase in the wealth of the nation, including private property, and, an increase in corporate revenues, which was also related to the growth of tax revenues.

Fig. 5 represents the results of a regression analysis, where changes in GDP per capita are affected partly by changes in the corporate tax rate, but there are other factors that affect the development of this macroeconomic variable. The distance of individual points from

the trend line proves the dependence between the quantities, however, it does not show a linear dependence.

Finland follows the motto: "Administrative tax at the right time", which confirms that the tax system is one of the priorities of the state's economic policy. The tax system emphasizes the principles of justice, reliability, and high professionalism. The government is trying to support businesses through various investment or regional incentives and tax incentives.

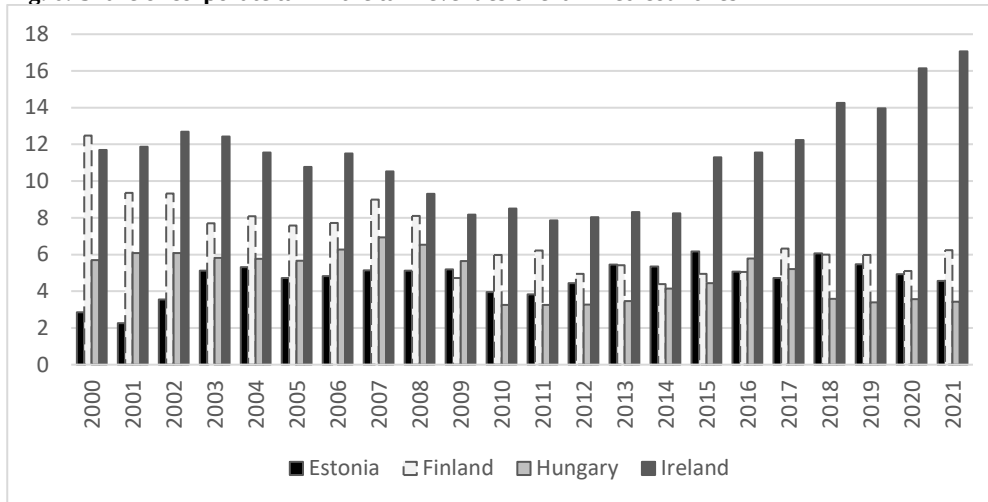
Fig. 5: Results of regression analysis in Finland



Source: author's calculation based on OECD data.

Corporate tax is the fourth highest tax revenue in Finland. Corporate tax burden is also below average in the EU. In 2016, corporate tax revenues accounted for 2.2% of total GDP and the corporate tax rate is 20%. The development of the corporate income tax rate was similar to the most EU countries. Between 1981 and 1984, the rate was up to 61.8%. The most significant rate cuts occurred as part of the reforms in the first half of the 1990s. The current level of the rate was set based on the 2014 reform when it was reduced from 24.5% by 4.5 percentage points. We can state that Finland is moving towards reducing the corporate tax burden, with the aim of attracting new foreign investors to the country. This is confirmed by the great possibility of using accelerated depreciation as well as the deduction of research and development costs. Dividend income - dividends received by Finnish companies are exempt from tax in most cases. In 2019, an analysis made by NimbleFins compared economic data, business environment, business costs, and the quality of Europe's workforce to find out which European countries have the best conditions for start-ups. According to this analysis, the ranking of the best European countries has been created. The variables, that have been considered are the amount of a highly educated workforce, a strong economy, a healthy business environment, relatively low business costs, and various tax benefits.

The results show, that Ireland is in the 4th place in terms of the overall business environment for start-ups (the 1st place was Germany, 2nd United Kingdom, 5th Estonia and 9th Finland). If we take a closer look at the individual indicators of economic growth, other indicators speak in favor of these three countries too. Estonia is becoming number 2 in Europe in terms of business costs and labor quality. Finland is 3rd in terms of workforce quality and 5th in the business climate (competitive environment, access to finance, judicial system).

Fig. 6: Share of corporate tax in the tax revenues of examined countries

Source: author's calculation based on OECD data.

For all the examined countries, we can determine that the total corporate income tax does not play a major position in the tax system, nor it is considered the main source of the state budget revenue. The personal income tax exceeds the corporate income tax in total real numbers, meaning that the corporate income tax is only the third most important tax in the tax systems of the surveyed countries (the largest share is VAT). The share of corporate tax in the tax revenues of the surveyed economies is shown in Fig. 6.

Tab. 2: Results of regression analysis

	Estonia	Finland	Ireland	Hungary
Multiple R	0.8859199	0.662287649	0.33959504	0.7321733
R Squared	0.784854	0.43862493	0.115324791	0.5360778
Adjusted R Square	0.7740967	0.410556177	0.071091031	0.5128817
Standard Error	4629.8775	2014.707555	14723.3978	2709.1719
Observations	22	22	22	22

Source: author's calculation

Our model has shown, that in Estonia 77% of changes in GDP per capita might be caused by a change in the corporate tax rate. In Ireland, the value of this indicator was below 14%, and in Finland below 39%.

Tab. 3: Results of regression analysis

ANOVA Estonia	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Significance <i>F</i>
Regression	1	1563956619	1563956619	72.960147	4.17512E-08
Residual	20	428715315.9	21435765.8		
Total	21	1992671935			
ANOVA Finland	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Significance <i>F</i>
Regression	1	63429927.68	63429927.68	15.626805	0.000785094
Residual	20	81180930.68	4059046.534		
Total	21	144610858.4			
ANOVA Ireland	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Significance <i>F</i>
Regression	1	565177556	565177556	2.6071668	0.122048383
Residual	20	4335568858	216778442.9		
Total	21	4900746414			
ANOVA Hungary	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Significance <i>F</i>
Regression	1	169623408	169623408	23.110676	0.000107168
Residual	20	146792250.4	7339612.519		
Total	21	316415658.4			

Source: author's calculation

The proposed regression model does not have sufficient explanatory power, as is demonstrated in the tab. 3. Therefore, it has not been confirmed that when setting up start-up companies, the value of the nominal tax rate imposed on corporate income is the only factor influencing the decision to invest in start-ups. The decisions of investors are also influenced by the tax rates imposed on dividends.

Tab. 4: Investments in venture capital and its share on GDP 2013-2020

	Finland		Ireland		Estonia		Hungary	
	in 1,000\$	% GDP	in 1,000\$	% GDP	in 1,000\$	% GDP	in 1,000\$	% GDP
2013	304 000	0.11%	310 000	0.13%	73 200	0.29%	12 600	0.01%
2014	33 300	0.01%	626 000	0.24%	38 100	0.14%	17 800	0.01%
2015	346 000	0.15%	486 000	0.17%	65 800	0.29%	29 300	0.02%
2016	371 000	0.15%	916 000	0.31%	35 800	0.15%	19 900	0.02%
2017	514 000	0.20%	598 000	0.18%	81 900	0.30%	36 700	0.03%
2018	718 000	0.26%	1 100 000	0.29%	237 000	0.77%	88 300	0.05%
2019	858 000	0.32%	967 000	0.24%	141 000	0.45%	89 100	0.05%
2020	1 200 000	0.44%	1 500 000	0.35%	456 000	1.45%	130 000	0.08%
2021	1 900 000	0.64%	2 000 000	0.40%	986 000	2.65%	123 000	0.07%

Source: dealroom.co

The table also shows that the share of venture capital investment to GDP is relatively low, despite a growing trend. At the same time, it points out the negative impact of the pandemic, which leads to a reduction in the growing trend. The main requirement and reaction to the current situation in the world is the implementation of the digital transformation of the whole economy. This clearly implies a demand for acceleration in the restructuralization of the economy and may be ultimately reflected in the growth of the share of start-up investments to GDP.

Conclusion

In all examined economies, we have used linear regression to find the relationship between the corporate tax rate and GDP per capita. The main outcome of the analysis suggests that there is an indirect relationship between the decline in the corporate tax rate and GDP growth per capita. Although the models and dependent variables showed statistical significance, the regression analysis applied in the examined countries did not confirm the established hypotheses. The results of the regression did not show that the corporate tax rate is a significant factor that supports economic growth and confirmed the existence of the other statistically significant variables with a more significant impact on economic growth compared to the corporate tax rate.

The analysis of the quantitative indicators has also shown that a decline in the corporate tax rate is associated with a higher growth rate of GDP per capita compared to a period when there was no decline in this tax rate. The results of our analysis confirm our 1st hypothesis that changes in tax policy can also stimulate economic growth. This fact has been particularly pronounced in Estonia.

The second hypothesis, claiming that the amount of invested capital in start-up companies has a growing trend, which is supported by selected tax instruments was confirmed by the growing trend of venture capital investments, especially in Finland and Ireland.

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