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# The Analysis and Prediction of Sports Clubs' Funding via the Assignment Tax in Slovakia

**Abstract:** *Assignment tax plays an important role in the funding of non-profit organizations (NPOs) in Slovakia. The analysis is focused on the funding of Slovak sports clubs via the assignment tax. The hypotheses were defined as follows: H<sub>1</sub>: Local interest in sports clubs has a positive effect on obtaining the funds from the assignment tax; H<sub>2</sub>: Assignment tax donors (2%) are more inclined to support individual sports than team sports. The data analysis has proven the growth of the total sum obtained via the assignment tax over time. The growing income from the assignment tax for the whole non-profit sector was predicted by applying statistical methods. Based on the created model, the average annual decrease of sports clubs' incomes by 28.80% can be expected, from EUR1,750 in 2019 to EUR600 in 2022. This trend shows the development of the situation without the clubs taking any action. Thus, it can help them with setting promotional activities to gain more funds via the assignment tax in the future and optimizing their financial mix.*

**Keywords:** *Assignment tax, sport management, non-profit organizations, sports clubs, mathematical-statistical modelling, prediction.*

**JEL Classification:** *H25, Z23, C44, L31.*

## Introduction

Sport, as known in its today's form, has undergone a transformation into a regular business sector during the last few years. Revenues in sports have grown twice since 2005, whereas the sports industry grows faster than the global GDP (Sultan, Collignon, 2014). There are several classifications of sport. Sport can be classified using a division into mass, top, individual, and team sports (Lindwall et al., 2002), or by sectors (Hoye et al., 2015) in:

- Public/state sector (public administration, specialised entities engaged in the development of the sport),
- Non-profit/voluntary sector (community clubs, associations, international sports organizations),
- Professional/commercial sector (sports league and their member teams, producers of sports clothes and equipment, media companies, event managers, operators of stadiums and sports halls).

It should be noted that the sector in which the sports organizations are ranked does not relate to their legal form. A specific position belongs to the club (team) sports that have a high commercial potential (Slack, 2014). The importance of club sports also supports individual sports because the team athletes are often members of clubs just like the individual athletes are (tennis clubs, fight sports, etc.).

Within the strategic planning of sports organizations, it is necessary to consider various options and future development scenarios (Hittmár, Jankal, 2013; Fišera, 2007; Kauppinen, 2022). The whole process consists of the determination of the vision, analysis of the current situation, and proposal, implementation, and subsequent evaluation of the strategy. When compared to the process of corporate strategic management primarily focused on profit generation, the most distinctive difference consists in the determination of goals (Wilson, 1990; Blašková et al., 2018; Hoye et al., 2015; Širič, Dumanič, 2014; Bradbury, O'Boyle, 2017; Sroka et al., 2018; Madzik et al., 2017). These are connected to the way they are fulfilled, the level of

their achievement, and the subsequent communication of results to the public. All of this plays a key role in the whole process. The principal sports club goals should include sports success, sustainable funding, education of youth, and community building. Even though these goals might seem different, they are mutually interconnected. Nowadays, in the period affected by the coronavirus crisis, the sustainable funding of sports organizations becomes an issue for which solutions are being sought.

One of the strategic aspects of sport management is funding. This can be covered by various financial sources (Huml, McLeod, 2021; Kim et al., 2020). In several countries, one of them is represented by the assignation tax (AT).

The AT is a tool of financial support for the non-profit sector. According to Smetanková (2018), it has been first established in countries of Southern Europe to fund the Catholic Church. Funding of other organizations, usually focused on social purposes, in form of the assignation tax was introduced in other countries as well. Thus, it has become a supplement or a replacement for grants or donations. In contrast to donations, they are not determined for specific purposes. The taxpayers do not pay the full tax to the state, but they decide themselves which non-profit organization will be supported. Foundations, civil associations, churches, and other non-profit organizations are usually included in the consideration. The importance of this funding source has changed over time. Today, the assignation tax is applied to finance non-church organizations in Slovakia, Hungary, Lithuania, Romania, Italy, and Poland.

The rate of the assignation tax application varies in individual countries. In Slovakia, according to Act No. 595/2003 Coll., a natural person can allocate 2% of the income tax to a specific non-profit organization. If specified conditions are met, it can be even up to 3%. A legal person can allocate only 1% or 2%. According to Gheorghe (2016), since 2004, 2% of the income tax can be assigned to non-profit organizations, churches, and individual beneficiaries for scholarship purposes instead of to the state of Romania. According to Wygnański (2016), in Poland, people can assign up to 1% of the income tax to a specific non-profit organization. The assignation tax has been established there since 2004. According to the Ministry of Finance of Poland, this funding tool is still more and more popular, and since 2016, 50% of taxpayers have used it. According to Act CXXVI (1996), Hungary established the tax assignation (1%) as early as in 1996. However, only a non-profit organization included in the list, in which the state defined who can be the beneficiary of the tax, could be funded this way. Churches were not included in the list. Since 1998, it is possible to fund the churches too, using up to 1% of the income tax. The taxpayer thus can allocate 2% in total from the income tax. Vaidotas (2016) states that in Lithuania a similar list has been used since 2004, including the public non-profit organizations approved by the state to which a natural person can assign up to 2% of the income tax. In addition, since 2012, natural persons can assign another 1% of the tax to political parties to support them and fund their activities. In Spain and Italy, the assignation tax differs as its value is primarily determined to fund churches. Germany and Austria can be mentioned as well, but rather in connection with the church tax, not the assignation tax. Its amount can be subsequently deducted up to a determined value from the paid income tax.

Smetanková (2018) underlines that the Czech Republic is the only country within V4 in which this tool has not been established yet, even though there were some attempts to do so.

*The authors of this article have focused on the research on the assignation tax popularity in Slovakia as a whole and on its changing role in sports club funding. Within this topic, the research was more closely oriented on the investigation of assignation tax donors' inclination toward individual or team sports clubs. This article aims to analyse the effect of assignation taxpayers' inclination to fund sports clubs. The aim is also to predict, based on a statistical*

*model, the development of funds from the assignation tax for sports clubs in three years following the period studied.*

## **1. Theoretical Background**

The public expenditure in the sports sector covers the costs at the national as well as municipal levels. The total expenditure on sports per citizen in European countries considerably differs. The sports sector receives the most funds in Switzerland where the state supports sports activities with EUR278 per citizen. The traditionally high support for sports has been observed in France (EUR275) and in Nordic countries, such as Finland (EUR156) and Denmark (EUR139). On the contrary, Slovakia has one of the lowest sports expenditures (EUR40). In addition, if the costs of the National football stadium, which is an exceptional investment, were not included, the Slovak sports expenditure would achieve the amount of only EUR30. A worse situation is in Lithuania where the expenditure reaches EUR25 per citizen (Scheerder et al., 2017).

Due to the social and cultural environment, organisational sports structure, and the division of liability for sports in each country, the creation of the sports policy differs significantly. The influence of the state on the management of sports organizations is huge. Via the legislation, it affects not only organizations but also the environment in which they operate. Funds are an important part of this influence.

From the state's perspective, sports systems can be centralized (the public sector works as a driver of any changes) or decentralized (the public sector works as a partner while introducing any changes).

The private sector features a strong involvement of all market participants. The mechanism of demand and supply plays a dominant role in it. Countries such as Ireland, England, and other parts of Great Britain are good examples of this. Most European countries can be described using the framework combining the state and the private sector. It is characterised by a high level of government intervention and the public administration bodies have pivotal roles in it. Slovakia, Czech Republic, Finland, France, Spain, Poland, Portugal, Slovenia, Hungary, Estonia, Latvia, Lithuania, Malta, and Cyprus are included. The voluntary sector is also a strong, independent sector. It is strong in Denmark, Italy, Germany, Austria, and Sweden. For example, in Holland, an active society with close cooperation among all actors without the domination of any of them is characteristic (KMPG, 2018).

### **Sports funding in Slovakia**

In Slovakia, there are many parties involved in the sports environment, having a significant influence on funding sports organizations. These include the state, the self-governing regions, municipalities, sports associations, schools, suppliers, the public, players' agents, or parties directly forming the base of sports organizations, i.e., spectators, fans, or members themselves (professional players, children, parents, hobby players, and others). Main funding sources for sports organizations in Slovakia include the Ministry of Education, Science, Research and Sport of the Slovak Republic (later in the text as Ministry of Education of the SR) – 75.144 mil. EUR per year, the newly established Fund for the Sport Support – 20 mil. EUR per year, municipalities, and local administrations – 100 mil. EUR per year (Ministry of Education of the SR, 2020), and in minor scope, the sponsorships by private entities, representing 15% of the total amount of funding of sports. The financial revenues from TV broadcasting rights are generally negligible, and the revenues from ticket sales are a subject of ongoing discussions.

The redistribution of funds by the Ministry of Education of the SR is a crucial aspect. From the above-mentioned sum of 75.144 mil. EUR, 53 mil. EUR are being redistributed based on

the Act on Sport (440/2015 Coll.). This act defines the obligations of sports entities, defines rules for securing a more transparent distribution of public funds to entities active in the sports sector, and defines the system of inspections of efficient utilization of public funds. The financial allocation to a recognized sport (§ 68 of the Act No. 440/2015 Coll.) is important for redistribution of public funds to sports associations. A share allocated to every sport is calculated based on several criteria: i) success of young and professional athletes in a specific sport, ii) home and foreign interest in the sport, and iii) the membership base of athletes younger than 23 years of age. Based on these facts, it can be stated that sports in Slovakia are considerably dependent on state financial resources.

As it is seen in individual cases, the influence of the state on sports is considerable. However, the influence of the private sector should not be omitted either. In all three cases, the funds are provided by the state, via the ministry funding the whole sports associations or via municipalities directly funding individual sports clubs. The private sector also directly enters the funding scheme via various sponsorship contributions to sports clubs. In addition, many other parties participate in this system. To reach expected results, it is necessary to correctly manage all the parties involved.

Municipalities and their involvement in the management of sports organizations represent an important aspect of the whole sports organizations' funding topic. Therefore, following the theoretical basis summarized above, hypothesis  $H_1$  was formulated within this research:

*$H_1$ : Involvement of municipalities in sports clubs has a positive effect on obtaining the funds from the assignation tax.*

### **Assignation tax**

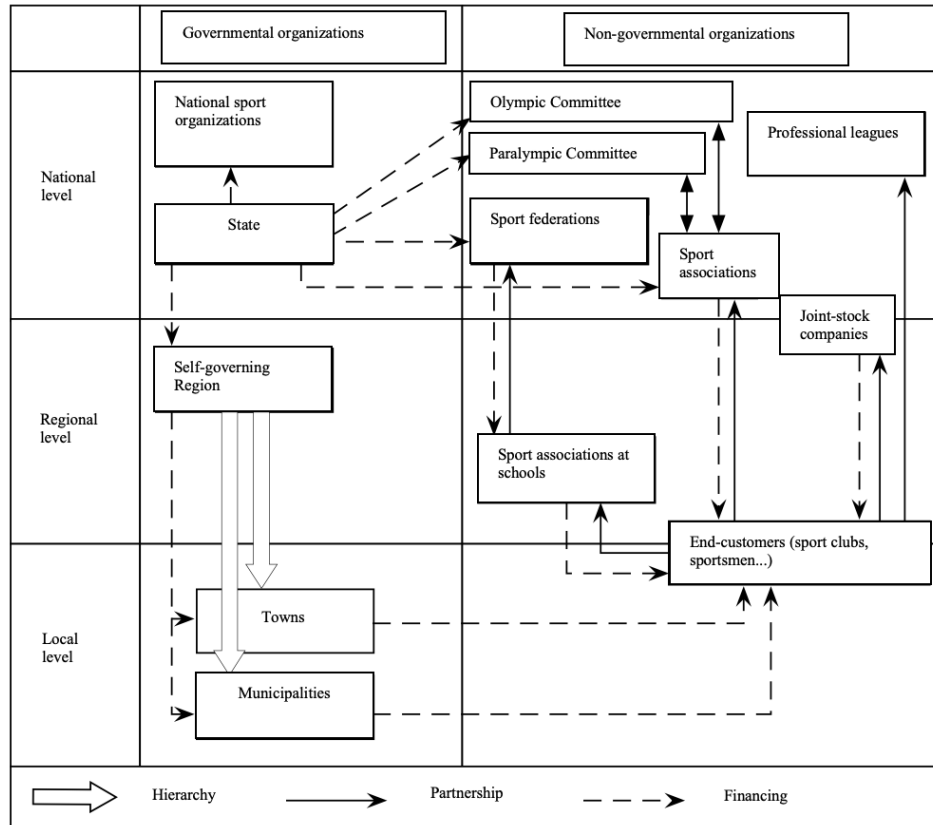
One of the funding options that sports entities can use is the assignation tax. It represents a portion of the tax the taxpayer has paid, entitled to decide whom the funds are to be assigned to (Fisterová, 2019). Although it has been stated that the sector in which the sports organizations are classified does not relate to their legal form, this does not apply in the case of the assignation tax. Act No. 595/2003 Coll., the Act on Income Tax, states that the beneficiaries can only be public associations, foundations, non-investment funds, and non-profit organizations providing generally beneficial services. In the art. §50 of the Act on Income Tax, the purpose of the assignation tax is defined as follows:

- health protection and support, prevention, treatment, socialisation of drug addict persons within the public health care and social services,
- support and development of physical culture,
- provision of social assistance,
- preservation of cultural values,
- support of education,
- protection of human rights,
- environmental protection,
- science and research,
- organization and promotion of voluntary activities.

According to Fisterová (2019), since 2014, sports organizations represented about 15% of the total value of redistributed assignation tax funds. This was up to 46 mil. EUR in 2018. Thus, it can be stated that this kind of funding has great potential. Within these non-governmental organizations, various partnerships are established. Besides the financial ones, partnerships can be created among sports associations and the customers, sports federations and sports associations, or joint-stock companies and the customers.

As this is an area with high potential, it is necessary to understand the structure and hierarchy of allocating or obtaining funds in the field of sports. It is the clarity and elaboration of individual levels and elements that will form the basis for a more effective design of recommendations for sports organizations.

**Fig.1: Funding of sports in Slovakia in 2018**



Source: based on Fisterová, 2019

Regarding the information obtained on the funding structure in Slovakia, a simplified model (Figure 1) was created. This model shows individual parties involved and their mutual links, in the form of a hierarchy, partnerships, or funds flows. Clubs can also obtain funds from their members, the public, fans, or parents of children being a part of the club (Feiler et al., 2019; Núñez-Pomar et al., 2020).

In relation to the knowledge of assignation tax and its function within the sports organizations funding as presented in the paragraphs above, hypothesis  $H_2$  was formulated:

*$H_2$ : Assignation tax donors (assigning 2% of their income tax) are more inclined to support individual sports than team sports.*

## 2. Data and Research Methodology

This section focuses on introducing the data structure applied in the research as well as the prediction methodology and its mathematical procedure.

### 2.1. Data structure

The data entries for the future development analysis and prediction were obtained from various sources. The list of all entities being funded by the allocation of assignation tax was used from the portal of the Financial Administration of the Slovak Republic

(www.financnasprava.sk). It showed detailed sums of funds received by all the beneficiaries. The data representing the annual incomes of sports clubs focused on individual sports. The data on the income of sports clubs engaged in team sports were obtained from the civic association WellGiving (www.wellgiving.sk), which records sums of contributions from the assignment tax for individual organizations in Slovakia. The following paragraphs show a basic description of the data gathered.

The number of NPOs funded from the assignment tax has increased over time. The number of sports clubs being funded by AT has varied. In this research, a panel of 654 sports clubs that received at least one payment from the AT within the period between 2011 and 2019 was used. For example, in 2019, 441 sports clubs were funded by the AT. As for the number of beneficiaries, it represents 2.85% of the number of non-profit organisations (15.5 thousand) that were beneficiaries of the AT in the given year. The total AT amount has varied over time for the whole non-profit sector as well as for sports organizations. The average income of a sports club in the given year was recalculated as a share of the total AT incomes of sports clubs and the number of non-profit beneficiaries, see Table 1.

The number of NPOs increased during the period considered. The number of sports clubs within NPOs peaked in 2016 and then declined. Sports clubs with this legal form were not emerging in high numbers. It can be assumed that if the use of the assignment tax in the funding of sports improves, more sports clubs will be established in the form of NPOs. This would support the benefits that this type of organization brings for society.

**Tab. 1: Data structure of NPOs and sports clubs with income from the AT during the period between 2011 and 2019**

Types of NPOs	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
NPOs	10,366	10,566	10,953	11,632	12,409	13,293	13,980	14,916	15,485
sports clubs	396	435	464	521	512	598	554	575	441
sports clubs/NPOs [%] *	3.82	4.12	4.24	4.48	4.13	4.50	3.96	3.85	2.85

\*Comparison of sports clubs' numbers and the total number of non-profit organisations in percentage  
Source: www.financnasprava.sk, WellGiving, own calculation

The hypotheses defined will verify the influence of the cities' interest in the sports clubs' income from the AT as well as the influence of clubs' specialization in individual or team sports. From this perspective, the structure has changed as follows (Table 2). Based on the average values over the period studied, it can be argued that the funding situation has developed more favourably for team sports than for individual sports.

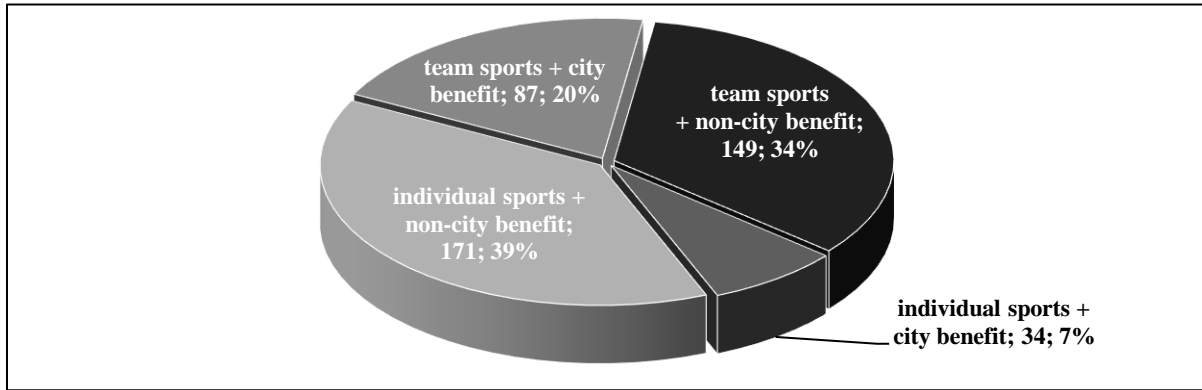
**Tab. 2: Data structure of the sports clubs based on their specialisation and funding**

Sports clubs	Year									Mean
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Beneficiaries	396	434	464	521	512	598	554	575	441	499
Without municipality	351	391	420	475	465	541	502	521	398	452
With municipality (abs.)	45	43	44	46	47	57	52	54	43	48
With municipality (rel.) [%]	11.36	9.91	9.48	8.83	9.18	9.53	9.39	9.39	9.75	9.65
Individual sports [%]	48.74	47.00	46.55	46.07	43.75	47.99	46.75	46.43	46.49	46.61
Team sports [%]	51.26	53.00	53.45	53.93	56.25	52.01	53.25	53.57	53.51	53.39

Source: WellGiving, own calculation

The most recent statistics available are those from 2019. Therefore, the sample structure of this last year is graphically shown in Figure 2 in detail, based on the cities' participation in the sports clubs' funding and on the specialization in individual or team sports.

**Fig. 2: Frequencies from the perspective of the cities' financial support and the club specialization in individual or team sports**



Source: WellGiving, own analysis

## 2.2. Prediction methodology of sports clubs' income from the assignation tax course

Time series modelling is most often aimed at revealing the causes of the changes or at describing their overall course. This article aims to analyse the timeline course containing sports clubs' incomes from the assignation tax. The following unidimensional time model has been used in modelling:

$$Y_t = T_t + \varepsilon_t \quad (1)$$

where  $Y_t$  is the dependent variable that characterizes sports clubs' incomes for 2011 – 2019,  $T_t$  is the trend component explaining the income changes in time, and  $\varepsilon_t$  is the random component.

The trend of total sports clubs' income from the AT is modelled using linear, quadratic, and exponential approximation.

Values of regression function parameters are estimated based on the least squares method. The linear function is expressed via the formula:

$$Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \dots + \beta_n t \quad (2)$$

where approximates points  $[t_0, y_0], [t_1, y_1], \dots, [t_n, y_n]$  represent the real value of incomes ( $y_i$ ) in individual years ( $t_i$ ). Such parameters  $\beta_i$ , ( $i = 0, 1, \dots, n$ ) are being sought, for which the following sum of variation squares  $S$  between  $y_i$  and  $Y_t = \beta_0 + \beta_1 f_1(t) \dots$  is minimal.

$$S = \sum_0^n (y_i - (\beta_0 + \beta_1 t_i))^2, \quad (3)$$

$S$  is the sum of squared residuals,  $y_i$  is the dependent variable whose value is found by observation (this is a real income amount in individual years),  $t_i$  is an independent variable (in this case the time),  $\beta_i$  is the function parameter.

Following the derivation of variables  $\beta_0, \beta_1$ , the values of parameters are obtained by solving the following equation system:

$$\beta_0(n + 1) + \beta_1 \sum t_i = \sum y_i, \quad (4)$$

$$\beta_0 \sum t_i + \beta_1 \sum (t_i^2) = \sum (t_i y_i). \quad (5)$$

In the quadratic approximation, it is necessary to find such quadratic function:

$$Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 \quad (6)$$

for which the sum of variable squares, measured by  $y_i$  and the coordinates  $\beta_0 + \beta_1 t + \beta_2 t^2$  calculated using the defined quadratic function, is minimal. The sum of squared residuals can be calculated as follows:

$$S = \sum_0^n (y_i - (\beta_0 + \beta_1 t_i + \beta_2 t_i^2))^2 \quad (7)$$

$S(\beta_0, \beta_1, \beta_2) = \sum_0^n (y_i - (\beta_0 + \beta_1 t_i + \beta_2 t_i^2))^2$  is the function of three unknown variables. Using the derivation according to  $\beta_0$ ,  $\beta_1$ , and  $\beta_2$  the equation system is obtained, and from its results, the values of the parameters being sought,  $\beta_0$ ,  $\beta_1$ , and  $\beta_2$ , emerge:

$$\beta_0(n+1) + \beta_1 \sum t_i + \beta_2 \sum (t_i^2) = \sum y_i \quad (8)$$

$$\beta_0 \sum t_i + \beta_1 \sum (t_i^2) + \beta_2 \sum (t_i^3) = \sum (t_i y_i); \quad (9)$$

$$\beta_0 \sum (t_i^2) + \beta_1 \sum (t_i^3) + \beta_2 \sum (t_i^4) = \sum (t_i^2 y_i). \quad (10)$$

For the exponential approximation, the exponential function is being sought:

$$Y_t = \beta_0 \beta_1^t \quad (11)$$

with the logarithm  $\ln Y_t = \ln \beta_0 + t * \ln \beta_1$ . Then,  $z = \ln Y_t$ ,  $A = \ln \beta_0$ , and  $B = \ln \beta_1$  are calculated, and it is necessary to find the function of type  $z = A + t * B$ . Unknown coefficients A and B can be obtained using the least-squares method for the linear function. The calculation of standard linear equations follows:

$$A(n+1) + B \sum t_i = \sum \ln y_i; \quad (12)$$

$$A \sum t_i + B \sum (t_i^2) = \sum (t_i \times \ln y_i), \quad (13)$$

After obtaining A and B, the transformation is used to find original constants  $\beta_0 = e^A$  and  $\beta_1 = e^B$ .

The significance of individual coefficients of linear, quadratic, and exponential approximation is tested using the t-tests. Subsequently, the determination coefficient tests the suitability of the chosen function. Based on the p-values of F-tests, the overall appropriateness of the models is assessed.

### 3. Empirical results and discussion

The results section presents the analysis of the variables and their change over time. This is followed by hypotheses testing and predictions based on econometric modelling.

#### 3.1. Analysis of the variables' course over time and hypotheses testing

Although the amount of the assignation tax is relatively low, if the club reaches a sufficient number of donors, the total sum of funds gained this way can represent a significant part of its budget. The assignation tax is only one of the tools for funding sports organizations. However, it is important to pay attention to it in research, especially in connection with the prediction of future changes. This reflects possible future results without specific clubs taking various actions to promote themselves, which will help them raise more funding from the assignation tax in the

future. It will also allow them to find the optimal financial mix involving a combination of several sources of funding.

From available sources, the data for 654 sports clubs were processed, covering the period between 2011 and 2019. They were sorted into clubs focused on team sports and individual sports. The value of average contributions is shown in Table 3.

**Tab. 3: Value of average income from the assignment tax in relation to the clubs' specialisation**

Specialisation of the club	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports	1,600	1,765	1,744	2,285	2,276	2,763	3,439	2,860	3,412
Team sports	2,399	2,511	2,645	2,985	3,296	4,601	4,654	4,276	4,452

Source: www.financnasprava.sk, WellGiving, own calculation

To calculate the percentage change, it was necessary to find the difference between the income amounts in individual years. This calculation is shown in Table 4.

**Tab. 4: Annual change in the income value from the assignment tax in relation to the sports clubs' specialization**

Specialisation	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports [€]	-	164.74	-20.95	540.79	-9.13	487.38	675.77	-579.24	552.03
Team sports [€]	-	112.47	134.18	339.34	311.20	1305.49	53.57	-377.94	176.66

Source: www.financnasprava.sk, WellGiving, own calculation

The percentage change has been calculated based on the share of the annual change in the income for that year. The calculated percentage changes for individual years are shown in Table 5.

**Tab. 5: Percentage annual change in incomes from the assignment tax in relation to the specialisation of the sports clubs**

Specialisation	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports [%]	-	9	-1	24	0	18	20	-20	16
Team sports [%]	-	4	5	11	9	28	1	-9	4

Source: www.financnasprava.sk, WellGiving, own calculation

The analysis has shown that the donors are more inclined to support the sports clubs focusing on team sports. The effect of the income percentage change on the total sum of income from the assignment tax in individual categories of sports clubs is shown in Table 6.

**Tab. 6: Value of the income from the assignment tax in relation to the youth education in sports clubs**

Specialisation	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports (youth) [€]	1,683.07	1,780.28	1,800.37	2,382.93	2,343.49	2,913.57	3,663.83	3,035.19	3,712.14
Individual sports (adults) [€]	1,224.43	1,696.11	1,489.17	1,839.32	1,968.53	2,078.52	2,423.60	2,133.21	1,899.83
Team sports (youth) [€]	2,704.15	2,722.93	3,114.92	3,517.71	3,697.41	4,411.13	4,861.33	4,658.77	4,662.99
Team sports (adults) [€]	1,972.06	2,215.72	1,988.94	2,239.46	2,734.77	4,868.75	4,341.92	3,714.70	4,091.44

Source: www.financnasprava.sk, WellGiving, own calculation

The annual change in the income from the assignation tax in these sports club groups is shown in Table 7.

**Tab. 7: The annual change in the income amount from the assignation tax in relation to the youth education in sports clubs**

Specialisation	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports (youth) [€]	-	97.21	20.08	582.57	-39.44	570.08	750.26	-628.64	676.95
Individual sports (adults) [€]	-	471.68	-206.94	350.15	129.21	109.98	345.08	-290.39	-233.38
Team sports (youth) [€]	-	18.77	392.00	402.79	179.69	713.72	450.20	-202.56	4.22
Team sports (adults) [€]	-	243.66	-226.77	250.52	495.31	2133.98	-526.83	-627.22	376.74

Source: www.financnasprava.sk, WellGiving, own calculation

As in the previous case, the percentage change has been calculated based on the share of annual change in the income and the income for that year. The calculated percentage changes for individual years are shown in Table 8.

**Tab. 8: Percentage annual change in incomes from the assignation tax in relation to the youth education in sports clubs**

Specialisation	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
Individual sports (youth) [%]	-	5	1	24	-2	20	20.48	-20.71	18.24
Individual sports (adults) [%]	-	28	-14	19	7	5	14.24	-13.61	-12.28
Team sports (youth) [%]	-	1	13	11	5	16	9.26	-4.35	0.09
Team sports (adults) [%]	-	11	-11	11	18	44	-12.13	-16.88	9.21

Source: www.financnasprava.sk, WellGiving, own calculation

The analysis of incomes from the assignation tax in 654 sports clubs revealed that the inclination of their donors is higher for clubs focused on team sports. Following the detailed examination, it was discovered that in the case of clubs focused on individual sports, the inclination was higher toward such clubs that are focused on youth education. In the case of clubs focused on team sports, it was revealed that the donors' inclination is higher toward the clubs focused on adult sports. This detailed analysis of the data and selected calculations is followed by the testing of the hypotheses' validity.

The first research hypothesis was formulated as follows:

*H<sub>1</sub>: Involvement of municipalities in sports clubs has a positive effect on obtaining the funds from the assignation tax.*

The hypothesis validity was tested via the research focused on the income of sports clubs from the assignation tax in Slovakia (Table 9). With the investigation of the structure of the clubs researched, it was found that 67 of them have active support from the municipality. In 2020 the information on contributions value between 2011 and 2019 was available.

**Tab. 9: Sports clubs' income from the assignation tax**

Income	Municipality involvement	
	Sports clubs with the municipality involvement	Sports clubs without the municipality involvement
Total income from the assignation tax for the period 2011 – 2016 [€]	18,740.11	20,984.93

Source: www.financnasprava.sk, WellGiving, own calculation

Seemingly, the influence of municipalities has no positive effect on sports clubs in getting the funds from the assignation tax. However, since 2013 the sports clubs with the municipality involvement have experienced a higher increase in funds from the assignation tax (specifically **1.58 times higher**) when compared to the sports clubs without the municipality involvement (**1.28 times higher**). This is also interesting when looking at the period after 2016. Therefore, a prognosis was made using ARIMA models for the following four years, i.e., till 2020 (included in Table 10).

The prognosis using ARIMA models was made with middle absolute percentage error MAPE = 5.54% (curve of clubs with no municipal involvement) and 2.80% (curve of clubs with municipal involvement). Thus, it can be stated that the total prognosis was made with the accuracy of 96%.

**Tab. 10: Summary of sports clubs' incomes from the assignation tax for the period 2013-2020**

Sports clubs	Year							
	2013	2014	2015	2016	2017	2018	2019	2020
Sports clubs with the municipality involvement [€]	2,375.43	2,813.42	3,334.61	<b>4,165.11</b>	<b>4,547.11</b>	<b>4,723.88</b>	<b>4,803.61</b>	<b>4,839.57</b>
Sports clubs with no municipality involvement [€]	<b>3,298.98</b>	<b>3,192.14</b>	<b>3,563.65</b>	3,961.49	4,254.08	4,389.62	4,428.30	4,439.35

Source: www.financnasprava.sk, WellGiving, own calculation

A considerable increase in sports clubs' incomes with the municipality's involvement has stabilised between 2013 and 2019, and it has a similar growth trend in the predicted period. Regarding the information gathered, a conclusion can be drawn that the involvement of a municipality in a sports club positively affects the sum of funds obtained from the assignation tax. Based on these findings, the **validity of hypothesis  $H_1$  has been confirmed**.

The second research hypothesis was formulated as follows:

**$H_2$ : Assignation tax donors (assigning 2% of their income tax) are more inclined to support individual sports than team sports.**

This hypothesis is linked to hypothesis  $H_1$ . Hypothesis  $H_2$  investigates this issue in detail from the perspective of the specialisation and structure of a club. The hypothesis validity was tested based on the research focused on sports clubs' incomes from the assignation tax in Slovakia.

The analysis showed that among 654 sports clubs examined, 306 focus on individual sports and 348 on team sports. Among the clubs focusing on individual sports, 251 focus on youth education and 55 do not focus on youth education. Among the clubs focusing on team sports, 203 focus on youth education and 145 do not focus on youth education. During the period researched, the average income from the assignation tax of clubs focusing on individual sports was **EUR2,072.54**. The average income from the assignation tax of clubs focusing on team sports reached the value of **EUR3,073.28**.

To evaluate hypothesis  $H_2$ , it was necessary to determine the annual change in incomes of individual groups of sports clubs. The calculation of the percentage annual change in the income from the assignation tax is shown in Table 11.

**Tab. 11: Calculation of the percentage annual change in income from the assignation tax**

Clubs' focus	Year									Mean
	2011	2012	2013	2014	2015	2016	2017	2018	2019	
The sum of income in individual years										
Individual sports [€]	1,601	1,765	1,744	2,285	2,276	2,763	3,439	2,860	3,412	2,461
Team sports [€]	2,399	2,512	2,646	2,985	3,296	4,602	4,654	4,276	4,452	3,536
Annual change										
Individual sports [€]	0	165	-21	541	-9	487	676	-579	552	201
Team sports [€]	0	112	134	339	311	1 305	54	-378	177	228
Percentage annual change										
Individual sports [%]	0	9	-1	24	0	18	20	-20	16	<b>8.08</b>
Team sports [%]	0	4	5	11	9	28	1	-9	4	<b>6.88</b>

Source: www.financnasprava.sk, WellGiving, own calculation

The sports clubs focusing on team sports achieved on average 6.88% annual percentage growth in the income from the assignation tax. In comparison, the clubs focusing on individual sports achieved on average 8.08% annual percentage growth in the income from the assignation tax. Based on this information, it can be stated that the *validity of hypothesis  $H_2$  could not be confirmed*. In absolute values, as stated above, the amount of funds via the assignation tax for team sports organizations was higher. However, the mean value of percentage annual change (Tab. 11) was higher for individual sports. Thus, it can be expected that in the future, individual sports can become preferred by the assignation tax donors.

With a more detailed examination of incomes from the assignation tax of sports clubs focused on team sports, it was detected that the incomes from the assignation tax of several tens of thousands of euros were achieved by those sports clubs that have reached the highest level. The incomes of other sports clubs (focused on team sports) achieved the value lower than the one achieved by the sports clubs focused on individual sports.

### 3.2. Prediction of total incomes from the AT based on the application of the model created

AT incomes of NPOs have a growing trend and the incomes vary less than the incomes from the AT of just the sports clubs. In percentage, the incomes of sports clubs within the total incomes of NPOs from the AT achieved values ranging between 2.40% and 4.02%. In 2019, the incomes achieved the minimum of 2.40% when expressed relatively, see Table 12. In absolute terms (1.75 mil. EUR), it represents the fifth highest income of sports clubs, but also the fifth lowest income in the researched period of nine years (Table 12). The question is what the course of the total AT incomes (AT income of NPOs) will be, and what the future course of the AT incomes for sports clubs will be.

**Tab.12: AT income of NPOs and sports clubs between 2011 and 2019**

AT income	Year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
AT income of NPOs (mil. EUR)	40.39	42.14	48.81	52.12	48.43	60.93	63.27	68.34	73.07
AT income of sport clubs (mil. EUR)	1.32	1.41	1.45	1.74	1.84	2.45	2.26	2.08	1.75
Sports clubs/NPOs [%]	3.28	3.35	2.98	3.33	3.81	4.02	3.58	3.04	2.40

Source: own analysis

The trend of the total AT income of sports clubs is modelled using the approximation of total value of funds obtained by NPOs via the assignation tax. Three models were created:

$$\text{Linear model: } Y_t = \beta_0 + \beta_1 t, \quad (14)$$

$$\text{Quadratic model: } Y_t = \beta_0 + \beta_1 t_i + \beta_1 t_i^2, \quad (15)$$

$$\text{Exponential model: } Y_t = \beta_0 \beta_1^t, \quad (16)$$

where  $Y_t$  is the predicted value of AT income,  $\beta_0$  and  $\beta_1$  are the function parameters, i.e., the unknown constants, and  $t$  is time.

The values of regression function parameters were estimated using the least squares method. Subsequently, the models created were used to predict the values for the following three years. The tables below (Table 13 and 14) show the estimates of parameters in individual models.

**Tab.13: Estimates of parameters for the linear model**

Parameters	Statistical values			
	Coefficient	Error	t-share	p-value
Constant	1,310.03	214.076	6.119	0.0005
t	100.537	38.0423	2.643	0.0333

Source: own analysis

The model created had the following characteristics: coefficient of determination = 0.499435;  $F(1.7) = 6.984$ ; p-value (F) = 0.0332.

**Tab.14: Estimates of parameters for the quadratic model**

Parameters	Statistical values			
	Coefficient	Error	t-share	p-value
Constant	769.966	303.146	2.54	0.0441
t	395.115	139.193	2.839	0.0296
t <sup>2</sup>	-29.4578	13.575	-2.17	0.0731

Source: own analysis

The model created had the following characteristics: coefficient of determination = 0.719539;  $F(2.6) = 7.69669$ ; p-value (F) = 0.022061.

**Tab. 15: Estimates of parameters for the exponential model**

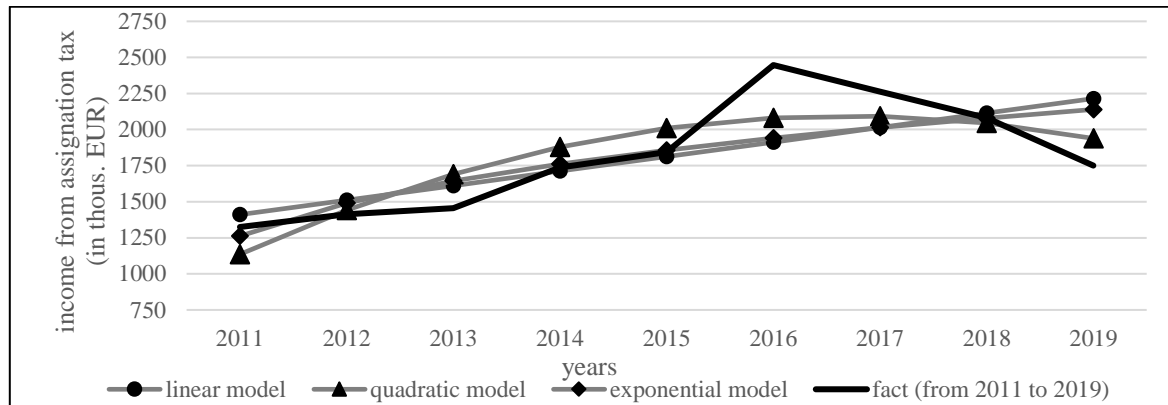
Parameters	Statistical values			
	Coefficient	Error	t-share	p-value
Constant	7.14041	0.10475	68.16	0.0003
ln t	240262	0.06648	3.614	0.0086

Source: own analysis

The model created had the following characteristics: coefficient of determination = 0.651099;  $F(1.7) = 13.063$ ; p-value (F) = 0.008575.

The significance of individual coefficients was tested using t-tests. In all models, the coefficient is statistically significant at the 5% level. The determination coefficient tests the suitability of the function chosen. The higher this indicator is, the better the chosen model approximates the empiric data. The best determination coefficient of 71.9% is achieved in the quadratic model. In comparison, the linear model had the lowest value of 49.9%. The approximation of individual models with empiric data is shown in the following figure (Figure 3). Based on p-values for F-tests, the overall model importance is assessed. In all models, the zero statistical hypothesis on the non-significance of the model was rejected even at the significance level below 1%. Based on the tests, the models are statistically significant.

**Fig. 3: Approximation of AT incomes for sports clubs between 2011 and 2019**



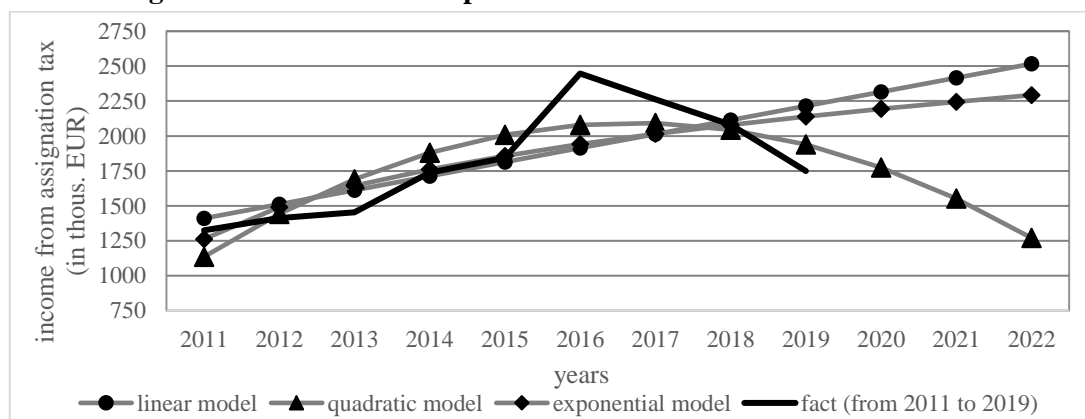
Source: own calculation

To create the model that suits for the prediction, the residual component was tested for homoscedasticity presumptions, residua normality, and auto-correlation non-existence. Based on the p-value of histograms of individual models, the normal distribution of residua was not rejected. Similarly, based on the p-value of the White's test for heteroscedasticity, it was not rejected that the homoscedasticity was present in models. Nevertheless, there is an undesirable correlation in models among residua based on the low p-value in the Durbin-Watson's statistics. Even though this presumption was not fulfilled, this model can be considered reliable. The quadratic model proved to be the most appropriate one. Its form is as follows:

$$Y_t = 769.97 + 395.12t - 29.458t^2 \quad (17)$$

Figure 4 shows the predicted future values of sports clubs' incomes. While a growth in incomes for all NPOs from AT can be expected in the long run, in the case of sports clubs, the situation is opposite. Based on the quadratic model, the predicted incomes of sports clubs overall will achieve the following values: 1.78 mil. EUR in 2020, 1.56 mil. EUR in 2021, and 1.27 mil. EUR in 2022. The coefficient of determination is 0.7195, which means that 72% of the data variability was explained by the chosen regression model.

**Fig. 4: Modelling the AT incomes of the sports clubs between 2020 and 2022**



Source: own calculation

### 3.3. Elimination of the serial correlation in the quadratic model

Serial correlation was detected in the selected quadratic model. The assumption of the absence of serial correlation is as important as the other assumptions necessary for the validity of the model. For this reason, a calculation is performed to remove the serial correlation. The brief procedure follows these steps:

- The serial correlation coefficient is estimated.
- Variables are transformed based on the previous point.

- The parameters of the new model are estimated.
- Based on the new parameters, the value of the dependent variable in the new model is predicted.
- Predicted values are transformed back to obtain an estimate in the original model.

The serial correlation coefficient was calculated, and its value was 0.1951. Based on this, the variables were transformed (see Table 16). However, this reduced the number of observations to 8. The parameters of the new model were estimated in Table 17 and the transformation of the predicted values of the dependent variable based on this is shown in Table 16, in the section “inverse transformation”.

**Tab.16: Process of variables transformation and inverse transformation**

Transformation of variables				→	Inverse transformation			
	t*	t <sup>2</sup> *	y*			t	t <sup>2</sup>	y
Data	1.804	3.805	1,154.029		1	1	-	
	2.609	8.219	1,178.952		2	4	1,412.476	
	3.414	14.244	1,454.323		3	9	1,454.526	
	4.219	21.878	1,504.501		4	16	1,738.100	
	5.024	31.123	2,087.367		5	25	1,843.604	
	5.829	41.976	1,786.025		6	36	2,447.054	
	6.634	54.440	1,638.789		7	49	2,263.445	
	7.439	68.514	1,344.228		8	64	2,080.388	
Prediction	8.244	84.197	1,139.089		9	81	1,750.112	
	9.049	101.490	762.117		10	100	1,480.536	
	9.853	120.393	297.350		11	121	1,108.485	
					12	144	600.114	

Source: own calculation

**Tab.17: Estimates of parameters for the new quadratic model**

Parameters	Statistical values			
	Coefficient	Error	t-share	p-value
Constant	-67.82819511	481.1585216	-0.1409685	0.893398173
t	703.3961157	227.4939204	3.091933685	0.027099919
t <sup>2</sup>	-54.5382387	19.51460504	-2.794739559	0.038230268

Source: own calculation

The model created had the following characteristics: coefficient of determination = 0.700715; F = 5.853255; p-value (F) = 0.0490016.

The coefficient of determination is 0.7007, which means that 70% of the data variability is explained by the chosen regression model. Based on the quadratic model, predicted incomes of sports clubs overall will achieve the following values: 1.48 (originally, with serial correlation present, 1.78) mil. EUR in 2020, 1.11 (originally 1.56) mil. EUR in 2021, and 0.60 (originally 1.27) mil. EUR in 2022. The elimination of autocorrelation from the quadratic model led to a decrease in the sum of estimated revenues, especially in the forecast for 2022, where the estimated revenues decreased from EUR 1.27 million to EUR 0.60 million. The question is to what extent the economic results of organizations will be affected by the COVID-19 pandemic. As a result, the payment of the income tax, and therefore the assignment tax, is also affected.

## Discussion and conclusions

Funding of sports organizations is a topic that is extremely current. Although the analysis shows that the sports in Slovakia, as well as in a large part of Europe, depend on the state funding, there are still various ways how to increase the sports organizations incomes (Varmus,

2022). The assignment tax seems to be a viable option. The successful tax collection is subject to a strong community of a sports organization. This was confirmed by the hypothesis H<sub>1</sub> which presumed the involvement of municipalities in sports organizations. The findings described above represent pieces of key new knowledge enriching the area of sports management and the funding of sports organizations. The municipality intervention can be beneficial also in the promotion of donative programs (Soviar et al., 2018). This is only a presumption as it was not a primary subject of the research, but this is an intriguing issue on which future research can focus.

The supposed inclination toward individual sports was not confirmed and thus there is a higher inclination of donors of assignment tax toward team sports. There was a presumption of strong inclination to support a specific athlete in individual sports. Such finding was presented by other researchers' results (Annamalai et al., 2022). Thus, a positive course of supporting team sports by the assignments tax donors also belong to the key novel findings from this research. Based on the results, the importance of the community and the interconnection between individual and collective flow (Hallmann et al., 2021) can be emphasized as it can be concluded that team sports create a larger community of people and thus a larger spectre of possible donors. Based on the calculations, a lower assignment tax collection, i.e., the decrease of more than 60% over the next three years after the period studied can be expected. On the one hand, this might be surprising, but on the other hand, this could be a reaction to the improvement of funding of sports organizations by the state. The sports organizations rather focus on the performance within qualitative and quantitative criteria. Their incomes are higher than in the past, thus they might lose their motivation to develop a program for the assignment tax collection.

There is an opportunity to obtain contributions via this tax for smaller sports organizations that hardly meet the criteria given by the Act on Sports. A great potential consists of the volume of funds that are available, and as noted by the chief sports controller in the SR (Fisterová, 2019), the collection of the assignment tax achieves its probable level of 50%, whereas only 15% of funds are assigned to sports.

The research was performed on a sample of 654 sports organizations and the prediction for the future period was made. This can help the sports organizations and even the state authorities to do measures to improve the situation. However, this research has its limits. Specifically, it can be concluded that there are various sports organizations that are very successful in the assignment tax collection as well as those that are unsuccessful. Thus, the overall generalization cannot be achieved. This point calls for further research focused on the use of qualitative methods, namely detailed interviews with sports club managers and the public. This should result in the determination of the atmosphere in the society regarding the assignment tax donation, e.g., conducting national-wide research of the public opinion. Results of such research would complement the current findings and help better understand the current situation, specifically the critical points and policies for a better allocation of the assignment tax. Since the predictions resulting from this research can be compared with the actual values of the variables studied reached in the future, this also represents a direction for other research efforts.

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