

# Seeking Financing in Increasing the Budget Allocated to Space Research and Searching for Taxpayer Compliance in Terms of Taxes as a Source of Financing\*

Yasemin TAŞKIN<sup>1</sup> , Zinnur TUNÇ<sup>2</sup> 

<sup>1</sup>Assoc. Prof., Istanbul University, Faculty of Economics, Department of Public Finance, Istanbul, Turkiye

<sup>2</sup>Res. Assist. PhD., Istanbul University, Faculty of Economics, Department of Public Finance, Istanbul, Turkiye

ORCID: Y.T. 0000-0003-1928-3760; Z.T. 0000-0001-6793-4957

## ABSTRACT

The space economy and its reflection on various industries affect the entire world. As a result, the increase in the share of the space economy in the global economy has drawn attention to this area. Because of its various difficulties, especially financing, space research is not a research area in which the private sector can operate alone. Thus, there are two basic elements of space research today. These are the public and private sectors. Reasons for this include factors such as the high cost of space research and difficulties in meeting this. This can be seen in the budgets allocated for space research. There is a trend of increasing the budgets reserved for space research in almost every country year by year. The guiding and indispensable role of the state enforces the existence of public resources in the budget and funding of space research. It is, therefore, inevitable that tax revenues, which account for the largest share of public revenues, are used as financing sources in space research. As taxes are the main source of financing and could trigger reactions from taxpayers, the prevention or reduction of these reactions before they arise depends on raising taxpayers' awareness of the benefits of space research. The study aims to examine the volume of space budgets, budget differences, the share of space budgets within public budgets, the tax compliance processes of those who are obliged to pay taxes when the taxes are the financing sources of space budgets and space research.

**Keywords:** Space economy, Reactions against tax, Taxpayer compliance, Space budget, Space financing

\*This study is an extended version of the paper with the same title presented at the 1<sup>st</sup> Space Economics, Space Law and Space Sciences Symposium on May 30, 2021.

**Submitted:** 30.07.2021 **Accepted:** 12.11.2021

**Corresponding author:** Yasemin TAŞKIN / taskiny@istanbul.edu.tr

**Citation:** Taskin, Y., & Tunc, Z. (2022). Seeking Financing in Increasing the Budget Allocated to Space Research and Searching for Taxpayer Compliance in Terms of Taxes as a Source of Financing. In B. E. Balin, V. N. Akun & S. Alis (Eds.), *Proceedings for the First Symposium on Space Economy, Space Law and Space Sciences* (pp. 47-31).

<https://doi.org/10.26650/PB/SS46PS01.2022.001.004>

## 1. Introduction

Although the space sector, which is in the focus of defense and aerospace sectors, has focused on realizing strategic goals, increasing space research and effects of gaining new technologies from the results of this research have spread to the whole world. In recent years especially, increasing space research has increased interest in this field.

The Increase of space research has caused there to be different space budgets from year to year and the public sector plays an active role in this area. While the increase in countries' budgets causes the questioning of resources transferred to the budgets, the use of some part of public revenues in space research causes debate on the necessity of this research.

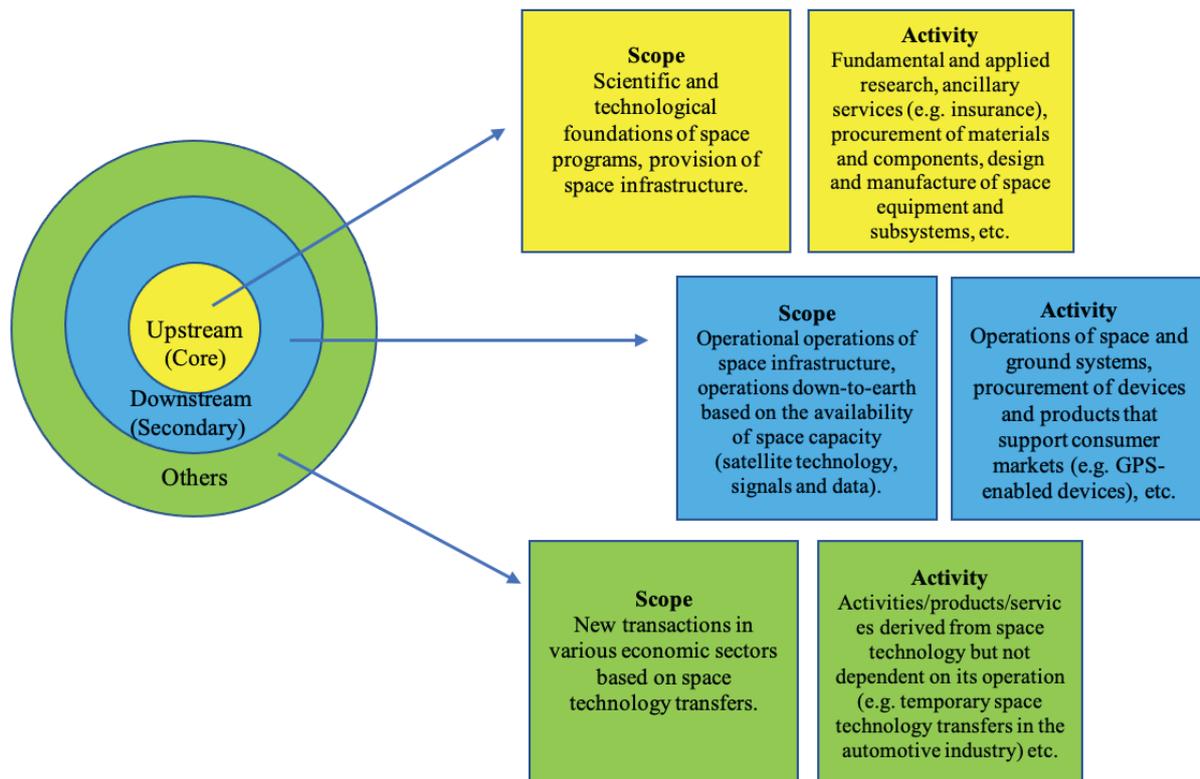
It is a natural result that the need for financing for space research is funded with taxes, which have the largest share in public revenues. However, this will have some effects on taxpayers' tax compliance processes. Although there are economical, administrative, legal and psychological reasons affecting this compliance, since the taxpayers' perception of the area where the tax is spent is one of the main determinants, it is important to manage this perception well in space research.

In this study, which aims to investigate the role of the public sector in the financing of space research and the tax compliance of taxpayers, the space economy and the role of the public sector in the space economy will be explained firstly, based on the space budgets of the countries and the share of these budgets in public expenditure. Then the tax compliance of taxpayers and the factors affecting this compliance will be examined in the case of the public sector's financing source taxes, and various suggestions will be made within the framework of the approaches in the doctrine.

## 2. Impact of Space Research on the Economy: Space Economy

Science is considered to be one of the biggest beneficiaries of the space age, and as a result of scientific space activities, a lot of information about space has been acquired (Crawford, 2016). Developed countries' multifaceted research, not only to discover the unknowns of space, has expanded the scope of space-related studies and directed them to strive to be strong in the military, economic, and political fields. This situation has caused developing countries to turn to this field (Bozkurt & Ercan, 2016).

Space contributes to many fields such as research, development, education, innovation, economic growth, and increasing the quality of employment (Republic of Turkiye Ministry of Foreign Affairs, 2018). In addition to the economic contributions of space-oriented research, there are also contributions to social life. In this context, the space economy can be defined as *“the full range of activities and the use of resources that create and provide value and benefits to human beings in the course of exploring, understanding, managing and utilizing space”* (OECD, 2020).



**Figure 1.** Space Economy  
 Source: Derived from OECD (2012); OECD (2020).

The space economy can be expressed as actions that add value to the benefit of humanity in relation to the exploration, research, and management of space. In this context, the space economy has two different aspects: Products and services related to space, and the information community consisting of data obtained from space research (OECD, 2012). Thus, the space economy has gone far beyond the space manufacturing sector, including the increasingly pervasive effects of space-derived products, services, and knowledge on economies and societies (OECD, 2020). As a matter of fact, the space sector, which is amongst the defense and aerospace industries, has been developed to serve strategic goals in various economies thanks to security applications, science and space research, and has been shaped as a separate sector (OECD, 2014).

### 3. Role of the Public Sector in Financing Space Research

Space-related government spending to achieve public policy goals includes issues such as space research or national security. In addition, there are activities involving commercial participants on subjects such as observation or telecommunications (Crane et al., 2020).

The actors of the space economy are the public and the private sectors (Thinktech, 2020). States have an important role in the space economy. In addition, academic institutions that conduct scientific research and small and medium-sized enterprises are also included in different activities in this economy (OECD, 2012). Although the role of the state in the early stages of space studies, the increase in studies has caused the private sector to be interested in this field. Today, global cooperation, especially public-private cooperation, is considered very important.

So much so that the Space Economy Initiative platform was established within the United Nations Office of Outer Space Affairs - UNOOSA only to carry out cooperation efforts (United Nations, 2021).

However, the space economy has brought global competition as well as cooperation. Today, this competition is not only between states; it also occurs among private sector companies. For this reason, the field of activity, which was called the 'space sector' in the past, is evolving into the 'space economy' today (Thinktech, 2020).

### **3.1. The Necessity of Funding Space Research (Positive Externalities) and the Seeking of Financing**

The number of public and private actors involved in space activities around the world has steadily increased over the past decade. This situation further encourages the development of the space economy and commercial activities in this direction. Space continues to be a strategic sector for many countries today (OECD, 2014). Global commercial revenues of approximately \$280-300 billion annually are generated from the space sector. Much of this revenue is commercial satellite services based on satellite capacity, such as telecommunications signals. In addition, the production of space systems is valued at less than \$20 billion and is generally maintained by government procurement. The second-largest share of global revenue belongs to consumer equipment, a market dominated by consumer electronics-oriented companies such as satellite dishes or transceivers (OECD, 2020).

The positive externalities of the space economy are not limited to these. As a matter of fact, space activities have effects far beyond many fields such as agriculture, transportation, the environment and commercial incomes. Space activities have positive effects on GDP through employment and income gains. It is possible to see these effects in many different commercial products, from the first space discovery and manned space flight missions to water and air cleaning systems in technology transfers (OECD, 2020).

As is seen, the global space sector is accelerating economic growth and sustainable development, thanks to its numerous positive externalities. While space activities drive innovation, it provides new markets, industrial capabilities, job opportunities, and new employment opportunities, also supports academic research and development (United Nations, 2021). For example, in the USA, the Global Positioning System-GPS is estimated to have generated approximately \$1.4 trillion in socio-economic benefits since its introduction in the 1980s (O'Connor et al., 2019).

Another example is Thailand. A study conducted by Thailand has stated that the economic and social impact of space studies on the country would be around \$1 billion. The Thai government has focused on policy and standard-setting, R&D, and international collaborations to grow their space economy. This strategy is complemented by a private-sector emphasis covering different development processes such as various aviation practices and standardizations (United Nations, 2021).

Startup financing is the way to develop new space industries and succeed in new business ventures. To obtain financing, business plans, projections and forecasts must be presented

to potential financiers that will show that investments and operations can be profitable (Livingston, 1999). However, in the new market, there is no proven way to measure the risk and return of investing in these areas (Foust, 2007). In the investments to be made, the length of the investment period and the payback period of the investments; the inadequacy of legal regulations in this area; high initial investment; factors such as technical and financial risks necessitate detailed examination of these investments. As a matter of fact, investments vary from traditional commercial investments in these aspects (Bozkurt & Ercan, 2016).

The space economy is a sector that should be supported by the public sector due to its benefits to society. From the defence industry to space discovery, the high targets of the governments increase the expectations that the state is a key power in space programs and that this power will increase in the future. Governments finance the vast majority of business activities worldwide through budgets and procurement schemes, and grant mechanisms. In addition, the public sector in many countries is involved not only in managing and coordinating space activities; it also plays an important role in continuing research and development (OECD iLibrary). As a matter of fact, it is inevitable for the state to take its place in space research as a source of funding. Although there is private sector financing in various countries, especially in the USA (Space X, Blue Origin, Rocket Lab, Astra Space, etc.), supporting the private sector with government incentives is indispensable for the future of the sector.

The United Nations emphasizes that public support is still key for the space sector, despite improvements in cooperation: *“Governments have understood that investments in space applications directly benefit society and contribute to a country’s overall economy. However, while more resources are dedicated to space activities, sustainability remains key to growing space safely”*. Therefore, steps need to be taken to maximise gains and secure public support in the space economy and other related sectors (United Nations, 2021). For this, increasing the budget will be an important start.

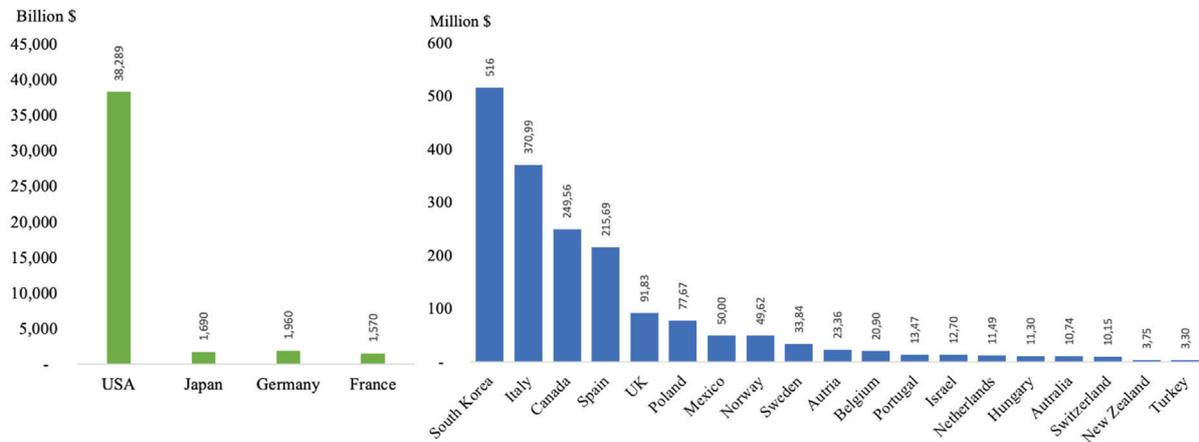
### **3.2. Public Financing and Budget in Space Research**

A budget, which has been defined in various ways in the literature, is a legal act that includes the income-expenditure estimates of the state or other public legal entities within a certain period and allows the implementation of these estimates (Feyzioğlu, 1984). In addition, a budget is a financing tool in the production of goods and services in the public economy (Altuğ, 2019). Due to this feature, in every case, the budget should be considered when public investment and public financing are available.

Public investments make up space budgets of approximately \$79 billion for the G20 countries in 2019 and the bulk of funding for space activities. These investments support national security objectives, broad socio-economic objectives, and the development of scientific capacities (OECD, 2020).

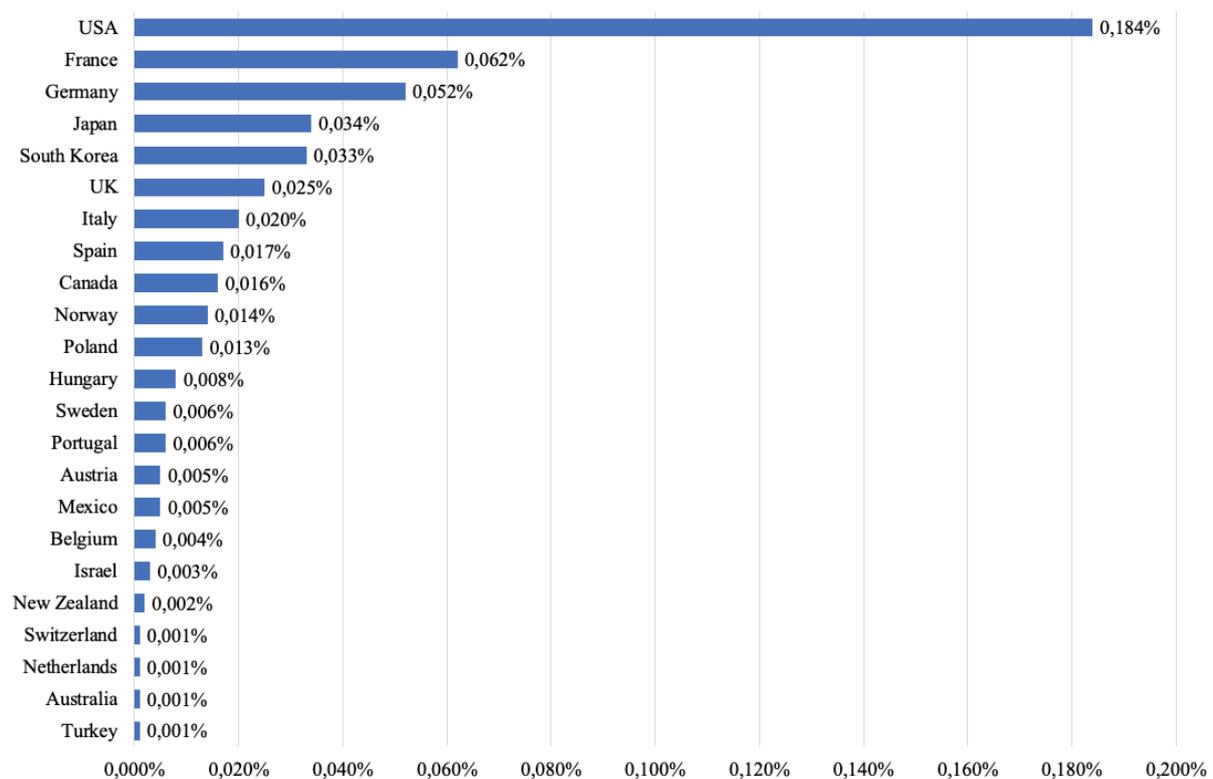
One of the most useful indicators for measuring the intensity of space financing is the ratio of space budgets to GDP (OECD, 2020). Because space budgets naturally differ according to each country. Although an absolute comparative analysis is not possible due to the difference in the items in the budget and the budget systems, analysis of the share of space budget in GDP according to countries’ own budgeting systems is a generally accepted method of comparison.

The total global space budget in 2018 was \$72.18 billion; in 2019, it increased by \$72.34 billion. However, as the COVID-19 pandemic, which affected all sectors, caused shrinkage in space budgets, the budget decreased by 0.81% to \$71.75 billion in 2020 (Space in Africa, 2021).



**Graph 1.** Space Budgets in OECD Countries (2020)  
**Source:** Space in Africa, (2021)<sup>1</sup>

Budget sizes alone are not comparable in that they do not include countries’ gross domestic product (GDP). For this reason, the share of budgets in GDP is often compared in the literature. Comparative space budgets of OECD countries, including Turkiye, are as follows:



**Graph 2.** Space Budgets Percentage in GDP in OECD Countries (2020)  
**Source:** Space in Africa (2021)<sup>2</sup>

1 For a comparison of the space budgets of the G20, APEC and NATO countries: Space in Africa (2021), p: 50-52.  
 2 For comparisons of the share of space budgets in GDP of G20, APEC and NATO countries: Space in Africa (2021), p: 50-52.

As can be seen, the OECD member countries with the highest share in the size of space budgets in GDP are the USA, France, and Germany. The budget of the Turkish Space Agency (Türkiye Uzay Ajansı-TUA), which has developed a ten-year program to build a strong satellite and launch industry, was approximately \$4.3 million in 2019; it decreased by 23.3% to \$3.3 million (₺24,529,000₺) in 2020 (Space in Africa, 2021). However, in line with the announced targets, a serious budget increase is expected in the coming years.

The budgets of countries are not only numerically large; they also differ in terms of system and classification. It is possible to list these differences as follows (Space in Africa, 2021):

- Some countries do not allocate annual budgets for space research. Example: Algeria declared \$1.3 billion (collectively) for the years 2006-2020.
- Some countries do not allocate an annual budget, but they announce a new budget when their budgets are over. Example: Luxembourg announced a budget of \$223 million in 2016 to provide early-stage funding and grants.
- Some countries have an established space agency for space research. For example, countries such as Morocco and Spain carry out their space activities through research institutions.
- Some countries do not declare separate budgets for space programs. A budget is allocated within the scope of assets created by public-private partnership financing or state-owned telecommunication companies.
- Finally, in some countries, instead of a single national agency, they allocate funds from their budgets to organizations financed by different countries, such as the European Space Agency (ESA) or the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT).

#### **4. Increasing the Space Budget and Tax Compliance**

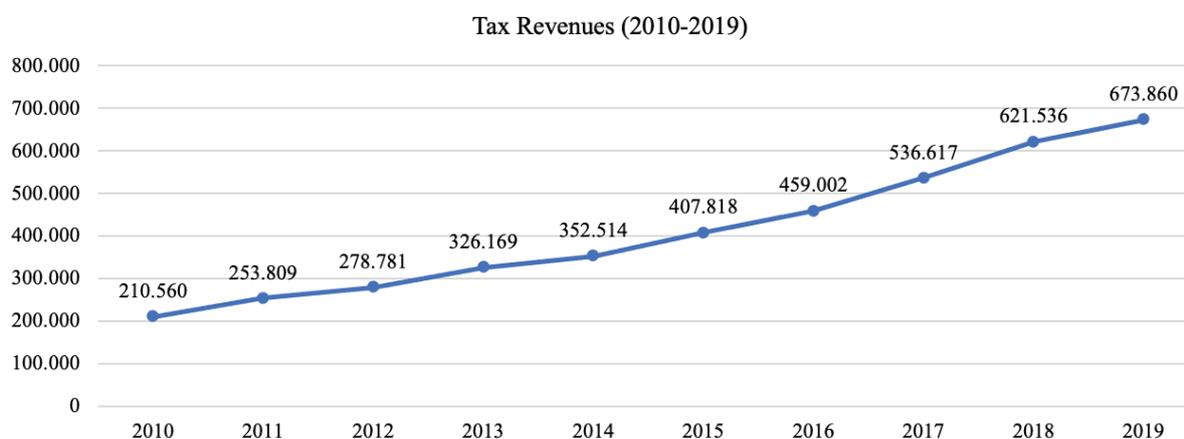
It is seen in the reports of the 11<sup>th</sup> Development Plan and the Turkish Space Agency that there's an aim to increase the space budget. It is possible to solve some of the negative effects that may arise during the balancing of the income and expenditure items of the budget, before they occur, by increasing the compliance of the taxes, which is the largest income item. If the space budget is increased, it is important to explain the reasons for this situation to the public because taxpayers have shown different reactions from the time of the first space research to the present day.

Even the budgets allocated in pioneering trials in the past have provoked a backlash. The reactions emerged from the idea that those resources should be transferred to better places. For example, the Apollo program, which cost \$180 billion dollars in today's money, was evaluated as an inhuman priority because 1/5 of the country lives in poverty. Growing backlash saw protest marches on July 15, 1969, the eve of the Apollo 11 launch. The space budget has been the subject of criticism with banners "*\$12 a day to feed an Astronaut. We Could feed a Starving Child for \$8.*" (Smith, 2019). Apart from these reactions, taxpayers can react actively (opposing the law) or passively (preferring leisure time).

### 4.1. Role of Taxes in Increasing the Budget

Funding space research with taxes will raise the reactions of those who are responsible for paying taxes. These reactions need to be balanced with the positive effects of public expenditures to be made by the state on the economy. As a matter of fact, the purchases to be made by the state will constitute an element of the demand and may have positive effects.

In case this financing is provided with the expenditures to be made from the public budget, it is important to determine what elements the financing source will consist of. The taxes required to finance the expenditures to be made by the state in the space economy are like compulsory public income.



**Graph 3.** Tax Revenues in Central Government Budget Realizations (Million TL)

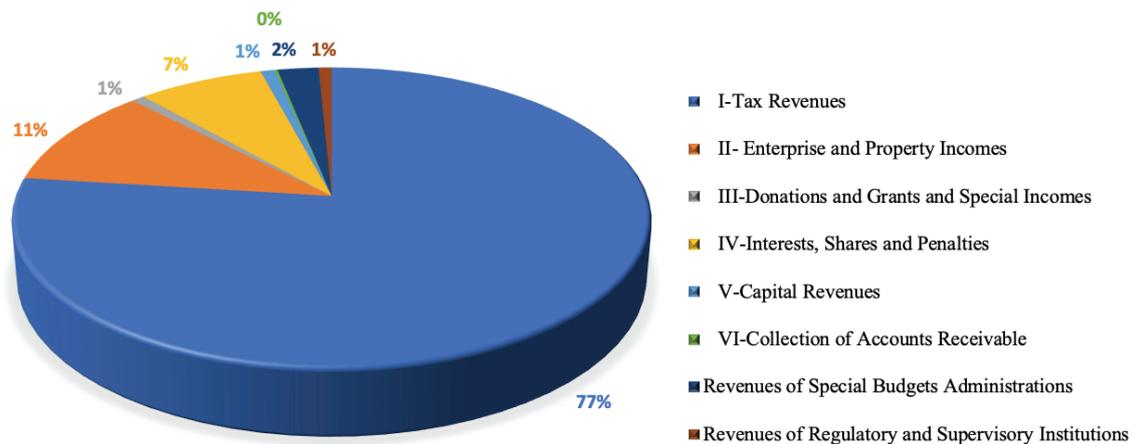
**Source:** It was created by using the current budget realisation data announced by the Republic of Türkiye Ministry of Treasury and Finance<sup>3</sup>.

3

**Central Administration Budget Realizations [2006-2019] Million ₺**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Central Administration Revenues	254.277	296.824	332.475	389.682	425.383	482.780	554.140	630.490	757.996	875.280
General Budget Revenues	246.051	286.554	320.536	375.564	408.676	464.188	533.203	607.138	729.063	847.692
I-Tax Revenues	210.560	253.809	278.781	326.169	352.514	407.818	459.002	536.617	621.536	673.860
II-Enterprise and Property Incomes	9.804	9.063	13.986	14.312	16.125	19.662	23.748	19.762	26.128	93.718
III-Donations and Grants and Special Incomes	966	1.068	1.652	1.096	1.281	1.241	1.122	1.373	1.190	6.993
IV-Interests, Shares and Penalties	21.114	19.739	22.708	23.651	28.302	26.560	34.910	35.560	71.848	64.488
V-Capital Revenues	3.376	2.530	2.054	10.105	9.549	7.933	12.828	11.680	7.809	7.107
VI-Collection of Accounts Receivable	232	344	1.355	231	905	974	1.594	2.145	551	1.525
Revenues of Special Budgets Administrations	6.333	8.174	9.622	11.445	13.524	15.083	17.012	19.148	23.761	20.925
Revenues of Regulatory and Supervisory Institutions	1.893	2.095	2.318	2.673	3.183	3.509	3.925	4.204	5.173	6.663

**Source:** Republic of Türkiye Ministry of Treasury and Finance <https://www.hmb.gov.tr/bumko-butce-buyuklukleri-ve-butce-gerceklesmeleri>



**Graph 4.** Percentage of Taxes in Central Government Revenues (2019)<sup>4</sup>

**Source:** It was created by using the current budget realization data announced by the Republic of Turkiye Ministry of Treasury and Finance

Looking at the above data, it is seen that the biggest share in budget revenues belongs to taxes. This situation reveals that the main source of finance in space research can be seen as taxing. In the framework of the active growth policy carried out by the states, taxes can contribute to education, research, and technical progress. For this purpose, regulations such as accelerated depreciation and the forward or backward transfer of losses can be applied to increase such investments (Turhan, 2020).

#### 4.2. Raising Awareness and Tax Compliance in Space Research

Tax compliance means that individuals or institutions act under the laws without coercion. Since taxes are a monetary obligation taken by force, people’s attitudes and behaviours towards taxes change. For example, the ‘unrequited’ feature of the tax causes negative reactions to the tax (Urus, 2017). Because taxpayers make an effort to get rid of these compulsory payments, which they perceive as a burden, and to reach a higher real income in this way (Turhan, 2020), therefore, it is important to consider the limits of taxation.

The concept of tax compliance is related to concepts such as tax awareness and tax morale. Tax awareness is the level of willingness of taxpayers, who are aware of the importance of tax in terms of the realization of public services to fulfil their tax-related duties. This means that the tax is paid voluntarily without any deterrent effect or pressure (Saruç, 2013). Tax morale is the behavior of taxpayers to truthfully fulfill their obligations arising from tax laws (Dayıoğlu, 2018).

Taxation in the field of public finance; examined within the framework of legal, political, economic, and financial boundaries. However, in terms of the space economy, the psychological limit of taxation is considered more of a priority. This limit is defined as tax morale or, more broadly, tax mentality (Schmölders, 1976). The psychological limit is very difficult to determine because it depends on taxpayer perceptions and different variables (Saruç, 2013). As in the history of space research, taxpayer reactions are an indication that this limit has been pushed. The most effective way to stay within the psychological limit is for the positive externalities of space studies to be known and, more importantly, adopted by society. For example, the

<sup>4</sup> As of the period when the data was used, the Ministry shared the latest 2019 data.

new employment opportunities that will emerge via a sectoral capacity increase are among the factors that will enable a budget increase in line with this limit.

The Apollo 11 reaction to space research isn't the only known tax reaction in history. There are many examples of taxpayer reactions in history: the Poujade movement and the Boston tea party are well-known examples of these reactions. These examples are important in that they show the dramatic consequences of the government's disregard for taxpayers -in fact, society in general- to taxation.

In short, the basis of the limit of taxation is, above all, psychological (Schmölders, 1976). For this reason, the legislator has to take into account the taxpayer reactions to the rules for this increased tax financing while increasing the budget. It is because there is a relationship between taxpayers' perceptions regarding a tax burden and the distribution of public expenditures and the opinions of taxpayers. In this regard, the perception of 'suitability' in public expenditures is decisive in the taxpayer-tax relationship (Kitapçı, 2015).

The compatibility of taxes and public expenditures - the success of the financial system - depends on how the current situation is perceived. Taxes have got an effect on reducing private consumption. When it is perceived to reduce income by taxpayers, there may be resistance to taxes (Demir, 2009). When taxpayers pay taxes, which is a compulsory payment, with a portion of their income, they expect to benefit from public resources. In such a case, it is discussed whether public expenditures made by states are effective or not (Didinmez, 2018).

Creating a perception that the effects of the expenditures will spread to the whole society and that the external benefit will affect the entire society in the financing of space research with taxes will increase social support for this research. The United Nations focuses on the goal of raising global awareness of how the growth of the space sector can strengthen socio-economic development for sustainable development (United Nations, 2021).

Ensuring that the public is informed about how space research will impact and improve their daily lives is essential to the foundation of a strong space economy. Therefore, taxpayer-focused policies are necessary to continue to develop both public and commercial space activities because it is important to understand how the effects of growth in the space economy will be presented for both the space sector and other sectors (United Nations, 2021).

## **5. Conclusion**

The space sector plays an increasingly important role in the efficient functioning and economic development of modern societies. Satellite technology used in navigation, communication, meteorology, and earth observation leads to an increasing stream of applications in air traffic control, transportation, natural resource management, agriculture, environment and climate change monitoring, entertainment, and the like. These developments create new markets as well as new sub-use areas. Since space is seen as a contributing lever for economic growth, social welfare, and sustainable development (OECD, 2014), space activities, which have such a high externality, are at the centre of public finance as a requirement of the principle of the social law. In this context, it is important to determine the role of the state in the financing of space research and the limits of this role. The increase in the role of the state in the economy and the

change in its duties in this process will cause the need for income to increase even more. The most important source of meeting this need is taxes. If the source of financing is taxation, it is necessary to increase tax compliance and provide social support. Public-private partnerships are ideal in financing space research; however, the role of the public sector will need to be increased, and this increase will need to be compensated by taxes, especially in the ‘take off’ phase and when fixed capital investments are required. However, the aim is rather than taxation for financing; it is to solve the financing and compliance problems that may arise due to the allocation of a significant part of the existing tax revenues to space.

Research data on the added value created by space studies in national economies reveal the magnitude of positive externality spreading to society. Externalities and the role of the state in spreading these externalities is one of the most important research areas of public finance science. The involvement of public finance in space research, which benefits from global trade volume to socio-economic welfare, is a necessity in terms of modern state understanding. In this context, it is important to clearly explain the effects of space research on society and to provide social support in this regard. It is necessary to spread the idea that space research is not only about the exploration of space and that the outputs to be obtained as a result of the research to be done will positively affect social life. Space research and their social effects -especially their positive externalities- become known and visible in society will also affect voluntary compliance in taxation. The important thing here is to raise awareness about the social benefits of space research.

For all these reasons, the factors affecting tax compliance should be evaluated specifically for space research, and measures should be taken to minimize the risks of socio-psychological factors. To increase Türkiye’s role in global competition -as in the examples of the world- it is necessary to ensure continuity in the increase of the budget to be allocated to space research. In the 2020 annual report of the Turkish Space Agency, which was established in December 2018, it was emphasized that various improvements should be made, the technological capacity should be strengthened, and the budget should be increased to reach a competitive level with similar institutions. This situation shows that Türkiye also aims to take place in the global competition. In addition, it was stated in the 11th Development Plan that Türkiye’s power in global competition would be increased, the National Space Program would be prepared and put into practice, and the institutional capacity of the Turkish Space Agency would be developed. The United Nations has identified three focal points of the space economy in its report of 2021. These are awareness-raising public events, capacity building, and e-learning activities for member states (United Nations, 2021). This determination is a clear expression of the meaning and importance attributed to awareness-raising public events in the international area, perhaps at the highest and most competent level.

## References

- Altuğ, F. (2019). *Kamu bütçesi* [Public budget]. İstanbul, Türkiye, Beta.
- Bozkurt, İ. ve Ercan, M.K. (2016). Kamusal bir sektör olarak uzay sektörü ve uzay sektörüne yönelik yatırımların değerlendirilmesi [Space sector perceived as a public sector and valuation of the investment projects in the space]. *International Review of Economics and Management*, 4, 1-26.
- Crane, K.W., Linck, E., Lal, B., & Wei, R. Y. (2020). Measuring the space economy: estimating the value of economic activities in and for space. *Science & Technology Policy Institute*, March. <https://www.ida.org/-/media/feature/publications/m/me/measuring-the-space-economy-estimating-the-value-of-economic-activities-in-and-for-space/d-10814.ashx>
- Crawford, I. A. (2016). The long-term scientific benefits of space economy. *Space Policy*, 37(2), 58-61. <https://doi.org/10.1016/j.spacepol.2016.05.001>

- org/10.1016/j.spacepol.2016.07.003
- Dayıoğlu, M. R. (2018). *Mali sosyoloji ve vergi uyumu* [Fiscal sociology and tax compliance]. Ankara, Türkiye, Gazi Kitabevi.
- Demir, İ. C. (2009). Kamusal harcamaların toplumsal algısı; ampirik bir araştırma [Public perception of public expenditures: an empirical investigation]. *Maliye Dergisi*, 157, July-December.
- Didinmez, İ. (2018). Davranışsal iktisat perspektifinden vergi uyumu analizi [Tax compliance analysis from a behavioral economics perspective]. Ankara, Türkiye, Savaş Kitabevi.
- Feyzioğlu, B. N. (1984). *Nazari, tatbiki, mukayeseli bütçe* [Theoretical, practical, comparative budget]. 7<sup>th</sup> ed., İstanbul, Türkiye, Filiz Kitabevi.
- Foust, J. (2007). The challenges of funding space startups. <https://www.thespaceview.com/article/887/1>
- Kitapçı, İ. (2015). Vergi etiği vergi psikolojisi ‘verginin sosyo-psikolojik teorisi’ [Tax ethics tax psychology ‘socio-psychological theory of tax’]. 3<sup>th</sup> ed., Ankara, Türkiye, Seçkin Kitabevi.
- Livingston, D. M. (1999). The obstacle to financing new space industries. [http://www.spacefuture.com/archive/the\\_obstacles\\_to\\_financing\\_new\\_space\\_industries.shtml](http://www.spacefuture.com/archive/the_obstacles_to_financing_new_space_industries.shtml)
- O’Connor, A. C., Gallaher, M. P., Clark-Sutton, K., Lapidus, D., Oliver, Z. T., Scott, T. J., Wood, D. W., Gonzalez, M. A., Brown, E. G., & Fletcher, J. (2019). Economic benefits of the global positioning system (GPS). RTI Report Number 0215471. Sponsored by the National Institute of Standards and Technology. Research Triangle Park, NC: RTI International. [https://www.rti.org/sites/default/files/gps\\_finalreport.pdf](https://www.rti.org/sites/default/files/gps_finalreport.pdf)
- OECD. (2012). *Handbook on measuring the space economy*. OECD Publishing. <https://doi.org/10.1787/9789264169166-en>
- OECD. (2014). *The space economy at a glance*. OECD Publishing. <http://dx.doi.org/10.1787/9789264217294-en>
- OECD. (2020). Measuring the economic impact of the space sector, <https://www.oecd.org/innovation/inno/measuring-economic-impact-space-sector.pdf>
- OECD. (iLibrary). [https://www.oecd-ilibrary.org/sites/c5996201-en/1/2/1/index.html?itemId=/content/publication/c5996201-en&csp\\_ffe5a6bbc1382ae4f0ead9dd2da73ff4&itemIGO=oecd&itemContentType=book](https://www.oecd-ilibrary.org/sites/c5996201-en/1/2/1/index.html?itemId=/content/publication/c5996201-en&csp_ffe5a6bbc1382ae4f0ead9dd2da73ff4&itemIGO=oecd&itemContentType=book)
- Saruç, N. T. (2013). *Vergi uyumu: Türkiye ve dünyada güncel gelişmeler* [Tax compliance: current developments in Türkiye and in the world]. Ankara, Türkiye, Akademisyen Kitabevi.
- Schmölders, G. (1976). *Genel vergi teorisi* [General tax theory]. 4<sup>th</sup> ed., (S. Turhan, Trans.). İstanbul, Türkiye, Fakülteler Matbaası.
- Smith, D. (2019). ‘Whitey’s on the moon’: why Apollo 11 looked so different to black America. 14 July. <https://www.theguardian.com/science/2019/jul/14/apollo-11-civil-rights-black-america-moon>
- Space in Africa. (2021). Global space budgets, a country-level analysis. <https://africanews.space/wp-content/uploads/2021/03/Global-Space-Budget.pdf>
- Thinktech STM Teknolojik Düşünce Merkezi. (2020). Yeni uzay çağı: 21. yüzyılda kozmik rekabet I, uzay teknolojilerinin geleceği. Araştırma Raporu [The new space age: cosmic competition I in the 21st century, the future of space technologies. Research Report], [https://thinktech.stm.com.tr/uploads/raporlar/pdf/462020102014272\\_stm\\_yeni\\_uzay\\_cagi\\_1.pdf](https://thinktech.stm.com.tr/uploads/raporlar/pdf/462020102014272_stm_yeni_uzay_cagi_1.pdf)
- Turhan, S. (2020). *Vergi teorisi ve politikası* [Tax theory and policy]. İstanbul, Türkiye, Filiz Kitabevi.
- Türkiye Cumhuriyeti Cumhurbaşkanlığı Strateji ve Bütçe Başkanlığı [Presidency of the Republic of Türkiye Strategy and Budget Presidency]. (2020). 2020 Yılı merkezi yönetim bütçe kanunu icmalı (ii) sayılı cetvel-özel bütçeli diğer kurumlar (fonksiyonel sınıflandırma) [Summary of the central government budget law no. (ii) 2020-other institutions with special budget (functional classification)]. <https://sbb.gov.tr/wp-content/uploads/2020/01/2-g-2020-Yılı-Diger-Ozel-Butceli-Idareler-Fonksiyonel-Kod-Icmali.pdf>
- Türkiye Cumhuriyeti Dışişleri Bakanlığı [Republic of Türkiye Ministry of Foreign Affairs] (2018). Uzay [Space]. <https://www.mfa.gov.tr/uzay.tr.mfa>
- Türkiye Cumhuriyeti Hazine ve Maliye Bakanlığı [Republic of Türkiye Ministry of Treasury and Finance]. (2019). <https://www.hmb.gov.tr/bumko-butce-buyuklukleri-ve-butce-gerceklesmeleri>
- United Nations. (2021). Space economy initiative 2020, Outcome Report, January. [https://www.unoosa.org/documents/pdf/Space%20Economy/Space\\_Economy\\_Initiative\\_2020\\_Outcome\\_Report\\_Jan\\_2021.pdf](https://www.unoosa.org/documents/pdf/Space%20Economy/Space_Economy_Initiative_2020_Outcome_Report_Jan_2021.pdf)
- Uruş, A.F. (2017). *Optimal vergileme ilkeleri ve vergilere karşı gösterilen tepkiler arasındaki ilişkinin değerlendirilmesi* [Optimal taxation principles and evaluation of the relationship between the reactions to taxes]. Bursa, Türkiye, Ekin Basım Yayın Dağıtım.