

# Taxation in Outer Space - Toward the Recognition of Tax Residences and Permanent Establishments in Space?

*La fiscalité dans l'espace – Vers la reconnaissance de résidences fiscales et d'établissements stables dans l'espace?*



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This article deals with two issues: the first one is that of the possibility of having a tax residence in space or on a planet other than Earth. In this context, the authors consider that currently, neither the outer space nor a planet fulfill the conditions to qualify as a State and that the notion of tax residence is so attached to the notion of State that it is not possible to create an extra-terrestrial tax residence. The second issue analyzed is the consequences of the potential existence of a permanent establishment, an enterprise or a real estate in space. By referring to notions of public international law, the authors seek to define in this context the contours of the territory of a state, the notion of “located therein” (art. 7 MC OECD) and that of “abroad”. The authors also open the discussion regarding a new nexus which would make it possible to attribute taxing rights of space income to the state of registration of space objects.

*Cet article traite de deux problématiques : la première est celle de la possibilité d'avoir une résidence fiscale dans l'espace ou sur une autre planète que la Terre. Dans ce cadre, les auteurs retiennent qu'actuellement, ni l'espace ni une autre planète ne peuvent remplir les conditions pour être qualifiés d'État et que la notion de résidence fiscale est si attachée à la notion d'État qu'il n'est pas possible de créer une résidence fiscale extra-terrestre. La deuxième problématique étudiée est celle des conséquences de la potentielle existence d'un établissement stable, d'une entreprise ou d'un immeuble dans l'espace ou sur une autre planète que la terre. En se référant à des notions de droit international public, les auteurs cherchent dans ce contexte à définir les contours du territoire d'un État, de la notion de « qui y est situé » (art. 7 CM OCDE) et de celle de « à l'étranger ». Les auteurs ouvrent aussi la discussion au sujet d'un nouveau lien fiscal qui permettrait d'attribuer le droit d'imposer des revenus de l'espace à l'État d'enregistrement d'objets spatiaux.*

## I. Introduction

Since the dawn of time, humanity has gazed at the stars with a mix of wonder and longing: while woven into the bright constellations the ancient Greeks saw stories of heroes and gods and the Maia read the secrets of time and fate, the Native Americans saw in the stars the realm of spirits. Hundreds of years

later, Jules Verne still imagined visiting the moon aboard a spherical projectile, and today 'Star Trek' and 'Star Wars' fans dream of embarking on interstellar journeys and visiting planetary civilizations.

For millennia, the prospect of leaving Earth and exploring the cosmos was nothing more than an apparently unattainable desire, a *utopia*. Then, in 1961,

the great breakthrough: for the first time in history, a human traveled into space. Milestones were achieved in rapid succession: in 1969, two astronauts took the first steps on lunar soil; in 1971, a robot successfully landed on Mars; in 2000, the first crew of the ISS remained in orbit around the Earth for 136 days; and in 2001, Dennis Tito became the first-ever space tourist.

Today, the dreams have only grown bigger. Elon Musk has declared his intention to build a community on Mars, and other visionaries have begun designing lunar or co-orbital hotels in space to welcome space tourists<sup>1</sup>. Space colonization, once confined to the pages of science fiction, is nowadays an increasingly tangible prospect; no longer a matter of “if” but rather “when.” The greatest humankind’s utopia is about to become reality.

As the settlements of people in space progresses, questions related to fiscal implications of spatial activities will naturally arise. Space travels and space economy, starting from space tourism to exploitation of natural resources found in outer space or on extraterrestrial planets will generate related income. Governments and international bodies or even extraterrestrial organizations might try to take part of the (tax) cake. Questions such as “Who will have the authority to tax income generated from these activities?”; “Will the inhabitants of these colonies be subject to taxation?”; “Is it possible to establish tax residency on the Moon or Mars?”; and “What about income from employment or business profits generated in a space hotel or a human colony on Mars?” will become increasingly relevant as space exploration and commercialization advance. In this article, we try to answer some of these questions based on the current international tax framework.

## II. Tax Residence in Space

### A. General remarks

With the creation of human settlements on celestial bodies – whether in the form of fully established cities or merely outposts for space tourism, like lunar hotels – it is inevitable that individuals will stay in space for extended periods of time. This scenario is

already a reality, as demonstrated by numerous cosmonauts such as Valeri Polyakov – who set a world record by spending 437 consecutive days orbiting Earth aboard the Mir space station between January 8, 1994, and March 22, 1995 – or Frank Rubio, who returned to Earth on September 27, 2023, after completing a 371-day consecutive mission on the International Space Station (ISS).

The critical question that naturally arises in this context is whether an individual might acquire tax residency in space due to an extended stay, and whether such stay leads to the termination of tax residency on earth. Coincidentally, individuals who live in space for extended periods of time might also serve as directors of a company. This means that high-level management and control decisions that substantially influence the company’s business conduct would be taken from space. In this regard, it could also be questioned whether the legal entity managed by these individuals (regardless of where it operates, whether in space or on Earth) should be considered a resident in space because its place of effective management (POEM) is located in space.

### B. Acquisition of tax resident status in space

The concept of “tax residence” is a domestic notion: this means that each State is free to determine in its own national laws the conditions under which a person is considered a resident for tax purposes<sup>2</sup>. States can base the acquisition of the “resident status” on various personal nexus, such as the existence of a domicile as defined in their domestic private law or the number of consecutive days that the person has stayed in the territory (qualified stay)<sup>3</sup>. What all these personal attachments have in common is that they establish an unlimited tax liability<sup>4</sup>. Consequently, for an individual or a company to be deemed a tax resident, there must be a State that can claim the existence of a personal nexus with the taxpayer.

We must therefore investigate the issue of whether the outer space, the moon, Mars or any celestial body qualify as states. In this regard, the Montevideo Convention on the Rights and Duties of States (1933) provides for hints. It establishes that for an entity to be recognized as a State under international law, it

1. FREELAN STEVEN, *Fly me to the moon: How will international law cope with commercial Space tourism?*, Melbourne Journal of International Law 11/2010, p. 4 f.; For further information, see: “Shoot for the Moon” *New Scientist*, www.newscientist.com/article/dn839-shoot-for-the-moon/; “Space Hotel: Orbital Assembly” *CNN Travel*, www.cnn.com/travel/article/space-hotel-orbital-assembly-scn/index.html; “Elon Musk’s Plan to Put a Million Earthlings on Mars,” *The New York Times*, www.nytimes.com/2024/07/11/technology/elon-musk-spacex-mars.html.

2. ISMER ROLAND / BLANK KATARINA, Art. 4 OECD MC, in: REIMER EKKEHART / RUST ALEXANDER (eds), *Klaus Vogel on Double Taxation Conventions – Volume I*, 5<sup>th</sup> ed., Wolters Kluwer, Netherlands 2022, N 8 and 3.

3. OECD MC Commentary, Art. 4 N 3.

4. DE VRIES REILINGH DANIEL / CHILLÀ CHRISTIAN, *Droit fiscal International*, Helbing Lichtenhahn Verlag, Basel 2023, N 318.

must meet four essential criteria: 1) a permanent population, 2) a defined territory, 3) a government and 4) the ability to enter into relations with other States<sup>5</sup>. Specifically, this means that a State needs a stable population residing within its territory that recognizes the State as its governing entity<sup>6</sup>; it must occupy a geographical area globally identifiable over which it can exercise its sovereignty<sup>7</sup>; and it must have a stable and functioning political organization that exercises control over the people residing in its territory and is capable of entering into relations with other states<sup>8</sup>.

Even in a scenario where colonies exist on celestial bodies, recognizing space as a State within the Montevidean conception remains complex. Some of the conditions set by the Convention are virtually impossible to fulfill in space: for example, it is extremely difficult to recognize the existence of a territory with defined boundaries when space is so vast that we still have no idea where it ends or what it contains; likewise, it is impossible for a potential political entity (whose future establishment remains unlikely) to be able to impose control over the entire extraterrestrial space, an extremely extensive and still uncharted territory.

Nonetheless, one could hypothesize a situation in which one of the colonies (for example, on Mars) organizes itself in such a way as to have a governing entity capable of exercising control over the population and enforcing its own laws. In this case, the territory over which it imposes its authority would be easily recognizable and definable. However, it remains to be seen whether the conditions of a permanent population and recognition by other (Earthly) States and the ability to enter into treaties and international agreements would be met in this specific case. Assuming these last two conditions are met, the inhabitants (even temporary ones) of one of these colonies could be considered for tax purposes as residents of the colonies. In such a case, if an Earthly State were to consider that the settlers also have a personal or economic attachment based on its domestic tax law, a risk of double taxation occurs. This situation would persist unless a double taxation

convention is established between the two States (i.e. between the Earthly State and the planet or celestial body recognized as a State), clearly defining which of the two States should be considered the State of residence under what circumstances<sup>9</sup>. For now, such situation remains however in the realm of science fiction. Under the current legal and factual situation, it is the author's opinion that no tax residence can exist in the outer space.

### C. Loss of tax resident status

Since the process of recognizing the existence of a State in space will not be swift, it is our opinion that in the near future, situations will arise where human beings will spend long periods of time in space (just think of the employees of lunar hotels) without, however, creating a residence in space for tax purposes.

The follow up question that arises is whether such persons retain their status as tax residents on Earth or whether they should instead be considered as persons without tax residence. The answer to this question lies in the domestic law of the Earthly State with which the person have had a personal attachment: indeed, similarly to the acquisition of residency, it is the national law that determines under what conditions a person is considered to have lost their tax resident status.

In Switzerland for instance, domestic tax law (Art. 3 LIFD; Art. 3 LHID) stipulates that an individual is considered a resident for tax purposes if he/she has a domicile – as defined by civil law – within the Swiss territory<sup>10</sup>. Civil law defines domicile as “the place where the person resides with the intention of establishing themselves there permanently” (Art. 23 CC). According to civil law again, a person's Swiss domicile “endures as long as they have not established a new one” (Art. 24 CC). Based on these considerations, the Swiss Federal Supreme Court has considered that the “principle of the permanence of the domicile” existing under civil law also applies in the field of international tax law<sup>11</sup>. Thus, according to

5. SHAW MALCOLM, *International Law*, 9<sup>th</sup> ed., Cambridge University Press, Cambridge 2017, p. 157.

6. DISTEFANO GIOVANNI, *Fundamentals of Public International Law – A Sketch of the International Legal Order*, Brill Nijhoff, Boston 2019, p. 90.

7. RIVIER RAPHAËLE, *Droit international public*, 4<sup>th</sup> ed., Presses Universitaires de France, Paris 2023, p. 261.

8. CRAVEN MATTHEW / PARFITT ROSE, STATEHOOD, *Self-Determination, and Recognition*, in : Evans Malcom (eds), *International Law*, 5<sup>th</sup> ed., Oxford University Press, Oxford 2018, pp. 199 and 205.

9. ISMER ROLAND / BLANK KATARINA, Art. 4 OECD MC, in: REIMER EKKEHART / RUST ALEXANDER (eds), *Klaus Vogel on Double Taxation Conventions – Volume I*, 5<sup>th</sup> ed., Wolters Kluwer, Netherlands 2022, N 5.

10. OBRIST THIERRY, *Introduction au droit fiscal suisse*, 3<sup>rd</sup> ed., Helbing Lichtenhahn Verlag, Basel 2023, N 52; OBERSON XAVIER, *Droit fiscal suisse*, 5<sup>th</sup> ed., Helbing Lichtenhahn Verlag, Basel 2021, p. 85; Message of the Swiss Federal Council of May 25, 1983, on Tax Harmonization, BBl 1983 III 86 and 155.

11. ATF 138 II 300, cons. 3.3; Ruling 2C\_1267/2012 of July 1, 2013 c. 3.3; for other case law see LOCHER PETER / MARANTELLI ADRIANO / OPEL ANDREA, *Einführung in das internationale Steuerrecht der Schweiz*, Stämpfli Verlag, Bern 2019, p. 253.

the court, “taxpayers who abandon their Swiss domicile [...] retain their tax domicile at the place of their former domicile as long as they have not established a new one at the place of their new residence”<sup>12</sup>. Therefore, to lose residency status in Switzerland, it is not sufficient merely to cease meeting the conditions set by domestic legislation, but it is necessary to establish a new tax residence abroad<sup>13</sup>.

Consequently, if a person domiciled for tax purposes in Switzerland were to decide to temporarily<sup>14</sup> permanently<sup>15</sup> relocate in space, under the current legal framework, he/she would still be considered a tax resident in Switzerland, as we consider it is not possible to establish residence in space. This means that by virtue of this personal attachment criterion (tax domicile in Switzerland), said individual would remain liable to tax in Switzerland as a resident.

The situation might be different in a State that conditions residency merely to a physical presence of the individual within its territory. In this case, the lack of physical presence in the State’s territory might lead, depending on the applicable domestic law, to a loss of tax residence.

### III. The Taxation of Income from Outer Space Activities

#### A. Tax liability in outer space: The consequence of the Earthly residence of persons performing activities in outer space

As previously established, we consider that, under the current factual and legal framework, no one can be a resident of space or of a celestial body. Therefore, individuals and legal persons performing activities or staying in outer space are, in principle, resident of a State on Earth. As also mentioned earlier, the criteria of personal attachment or nexus used by national legislations to determine residency status share a common feature: they all establish an unlimited tax liability for the resident<sup>16</sup>. This means that, regardless of the specific criteria employed, the

underlying principle is that a resident is subject to comprehensive – or worldwide – taxation<sup>17</sup>.

The implication of a full tax liability is therefore that the State of residence has, in principle, the right to tax the resident’s worldwide income, i.e. all types of income earned by the resident (employment income, business profits, royalties, interest, income from immovable property) regardless of their geographical origin<sup>18</sup>. In the case of income derived from outer space activities, the State of residence of the income’s beneficiary will thus in principle have the right to tax such extraterrestrial earnings.

There are two cases where this fundamental principle may, exceptionally, not apply: the first case is when the domestic legislation of the State of residence renounces unilaterally to tax income from sources located outside its territory (*Infra* III.B); the second case is when the State of residence has concluded a double taxation treaty (DTT) with another State (*Infra* III.C). In the absence of these two conditions, the State of residence has the right to tax any income irrespective of where it is generated (even in space).

#### B. Tax exemptions based on domestic law

##### 1. Unilateral exemption for permanent establishments and application of territorial systems

As previously explained, the way income derived from activities in outer space is taxed is determined by the domestic law of the State of residence of the beneficiary of these extraterrestrial incomes. This means that the tax treatment of space income is not uniform but varies depending on the recipient’s State of residence.

Alternatively to the worldwide taxation system, where national tax legislation provides that residents are taxed on their global income (including income generated abroad), States may decide to implement a territorial taxation system. In such a system, domestic tax law imposes taxes solely on income generated within its territory. Consequently, as a rule, under such system income generated abroad is unilaterally exempt from taxation<sup>19</sup>.

Nonetheless, it is important to note that this stark and schematic distinction is, in practice, more

12. Arrêt du TF 2C\_1021/2013 du 28 mars 2014, cons. 5.1.

13. LOCHER PETER, *Kommentar DBG – I. Teil*, 2<sup>nd</sup> ed., Helbing Lichtenhahn Verlag, Basel 2019, Art. 3 LIFD N 10; ZWEIFEL MARTIN/HUNZIGER SILVIA, Art. 4 OECD MC, N 49, in: ZWEIFEL MARTIN/BEUSCH MICHAEL/MATTEOTTI RENÉ (eds), *Internationales Steuerrecht*, Helbing Lichtenhahn Verlag, Basel 2015.

14. For instance as a worker in a lunar hotel.

15. For instance as a colonist on a celestial body.

16. ISMER ROLAND/BLANK KATARINA, Art. 4 OECD MC, in: REIMER EKKEHART/RUST ALEXANDER (eds), *Klaus Vogel on Double Taxation Conventions – Volume I*, 5<sup>th</sup> ed., Wolters Kluwer, Netherlands 2022, N 8.

17. OECD MC Commentary 2017, Art. 4 N 8; SCHWARTZ JONATHAN, *Schwartz on Tax Treaties*, 6<sup>th</sup> ed., Wolters Kluwer, Netherlands 2021, p. 178.

18. MALHERBE PHILIPPE, *Introduction to International Income Taxation*, Bruylant, Brussel 2020, p. 84; HONGLER PETER, *International Law of Taxation*, Oxford University Press, Oxford 2021, p. 24 f.

19. LANG MICHAEL, *Introduction to the Law of Double Taxation Conventions*, IBFD, Amsterdam 2010, N 4.

nuanced<sup>20</sup>. Countries typically provides in their domestic law specific conditions or exceptions for income not generated within their territory.

For example, Swiss law, which has adopted a worldwide taxation system, provides in Art. 6(1) and 52(1) LIFD that “tax liability based on a personal nexus is unlimited; however, it does not extend to enterprises, permanent establishments, and real estate located abroad”. This means that Swiss residents are in principle taxed on their worldwide income, except for income derived from enterprise, PEs or real estate located outside Switzerland<sup>21</sup>. In this regard, in the absence of an enterprise, a permanent establishment or a real estate located in outer space, Swiss income tax would be levied on space income. Given that particularity we think it is interesting to explore more in depth the Swiss concept of i) permanent establishment ii) located abroad.

## 2. The Swiss notion of permanent establishment

Under Swiss law, a permanent establishment is defined as any fixed location where all or part of the business activities or professional services of an individual are carried out. This includes branches, factories, workshops, sales points, permanent offices, mines, and other resource extraction sites, as well as construction or assembly locations that remain operational for a minimum of twelve month (Art. 4(2) LIFD). The definition of a permanent establishment in Switzerland is therefore broad and encompasses a wide variety of infrastructures<sup>22</sup>.

It follows that current and future human infrastructures in space – such as objects like geostationary satellites and orbiting laboratories similar to the ISS, real estates like homes for settlers or hotels on the moon, construction sites for buildings and mining sites on asteroids – could be considered permanent establishments under Art. 6(1) (LIFD)<sup>23</sup> and could thus potentially benefit from exemption from Swiss taxes on income generated through these infrastructures.

20. HOLMES KEVIN, *International Tax Policy and Double Tax Treaty – An Introduction to Principles and Application*, 2<sup>nd</sup> ed., IBFD, Amsterdam 2014, p. 19.

21. OESTERHELT STEFAN / SCHREIBER SUSANNE, Art. 6 LIFD N 8, in: ZWEIFEL MARTIN / BEUSCH MICHAEL (eds), *Kommentar zum schweizerischen Steuerrecht – Bundesgesetz über die direkte Bundessteuer*, 4<sup>th</sup> ed., Helbing Lichtenhahn Verlag, Basel 2022.

22. RICHNER FELIX / FREI WALTER / KAUFMANN STEFAN / TOBIAS ROHNER, *Handkommentar zum DGB*, 4<sup>th</sup> ed., Verlag Zürcher Steuerrecht, Bern 2023, Art. 4 N 18; OBERSON XAVIER, *Droit fiscal suisse*, 5<sup>th</sup> ed., Helbing Lichtenhahn Verlag, Basel 2021, p. 90.

23. Please see below for a detailed discussion on this.

## 3. The Swiss notion of “located abroad”

The tax exemption for income derived from an enterprise, a permanent establishment, or real estate is, however, subject to the condition that these are located abroad. In the context of space income taxation, one might therefore wonder whether the term “located abroad” could be interpreted as encompassing situations where income is generated through enterprises, permanent establishments, and real estate located in outer space – a territory that does not belong to any State (Art. 2 OST) – or whether it should only be interpreted as “located in another country”. If this second interpretation prevails income from a permanent establishment, an enterprise or a real estate of a Swiss company located in the outer space would not be exempted. In this regard, we must determine whether outer space can qualify as foreign/abroad under this national legislation.

To our knowledge, this issue has not yet been raised before the Swiss Federal Supreme Court and consequently remains unresolved. However, there are arguments in favor of a broader interpretation of the term “abroad” to include income generated through enterprises, permanent establishments and real estates in outer space.

Articles 6(1) and 52(1) LIFD represent a unilateral exclusion of foreign income from Swiss taxation<sup>24</sup>. This means that this exclusion applies regardless of whether a double taxation convention (DTC) exists between Switzerland and the state where the permanent establishment is located<sup>25</sup>. The rationale behind these provisions is to eliminate potential situations of double taxation<sup>26</sup>. Indeed, the presence of an enterprise, permanent establishment, or real estate within a country are common economic nexuses that allow countries to claim taxing rights over income generated by these entities. Switzerland, aware of this reality, has therefore unilaterally and preemptively established a system designed to prevent double taxation by waiving its right to tax the income derived from such entities. Based on this reasoning, it could therefore be argued that since there is no risk of double taxation in outer space, income derived from a permanent establishment located in outer space should not benefit from the exclusion

24. REICH MARCUS, *Steuerrecht*, 3<sup>rd</sup> ed., Schulthess, Basel 2020, p. 236.

25. OESTERHELT STEFAN / SCHREIBER SUSANNE, Art. 6 LIFD N 1, in: ZWEIFEL MARTIN / BEUSCH MICHAEL (eds), *Kommentar zum schweizerischen Steuerrecht – Bundesgesetz über die direkte Bundessteuer*, 4<sup>th</sup> ed., Helbing Lichtenhahn Verlag, Basel 2022.

26. LOCHER PETER, *Kommentar DBG – I. Teil*, 2<sup>nd</sup> ed., Helbing Lichtenhahn Verlag, Basel 2019, Art. 6 LIFD N 7; Swiss Federal Court decision 2C\_404/2017 of May 10<sup>th</sup>, 2017 c. 3.2.1.

provided by Art. 6(1) and 52(1) LIFD. In fact, in principle there is no authority other than the residence State that can claim the right to tax space income.

However, it is important to note that this exclusion is not only unilateral but also unconditional<sup>27</sup>. This means that Switzerland exempts from taxation any foreign income – provided it originates from an enterprise, permanent establishment, or real estate – regardless of the tax treatment of this income in the foreign jurisdiction<sup>28</sup>. In fact, these provisions apply even if the foreign income originates from tax heavens, i.e., countries whose domestic tax law does not impose taxes on income generated within their territory.

Based on the preceding, we believe there is no justification for treating income generated in outer space any different from income generated in a low tax jurisdiction or even a tax heaven. Consequently, we consider that income linked to an enterprise, a permanent establishment of a real estate located in the outer space or on a celestial body should be considered as foreign income under Art. 6(1) and 52(1) LIFD and, therefore, should benefit from the tax exemption provided by domestic law.

### C. Tax exemptions based on double taxation agreements

#### 1. Limiting power of double tax conventions

Double taxation conventions (DTC) are treaties established between two States that aims at eliminating instances where the same income is subject to taxation in both jurisdictions. Such a situation can occur when both States claims taxing rights over the same income<sup>29</sup>.

A State can assert its right to tax income based on a genuine connection or nexus to that income<sup>30</sup>. In principle, there is a general understanding that international law does not limit the right of the States to define the scope of their taxing rights, or the

nexus based on which they base those taxing rights<sup>31</sup>. For this reason, a multitude of different nexus exist: States may claim the right to tax a person's income if they are physically present within the State's borders, if this income is sourced within their jurisdiction, if it's generated through a real estate located within their territory, if the income's beneficiary is one of their citizens, etc.<sup>32</sup> Due to this wide variety of nexus criteria, it is not uncommon for two States to both have, based on their domestic law, the right to tax the same income. In this kind of situations, DTCs dictate how to allocate the right to tax between the two States depending on the type of income, thereby limiting or eliminating the unlimited taxing rights of the State of residence.

It follows that one of the key conditions for a double taxation agreement to limit the absolute taxing rights of the State of residence is the existence of another State that claims the right to tax the same income based on a nexus provided in its legal tax regime. In the context of space taxation, it is therefore necessary to consider whether there exists a State other than the State of residence that could claim the right to tax income derived from an activity conducted in space.

The question is not merely theoretical and has already been the subject of several discussions. Historically, the debate has focused on whether geostationary satellites (i.e. satellites that orbit above a fixed point on the Earth's surface) can be considered a permanent establishment located in the State over which they orbit or to which they transmit signals. Looking ahead, this question is likely to become increasingly relevant with the ever-increasing importance of data transmitted by satellite. Furthermore, as space commercial activities expand, they will inevitably involve the creation of physical infrastructure in outer space: properties like hotels for tourists, homes for settlers, refueling stations for spacecraft on long missions, storage facilities for mining equipment, spaceports for spacecraft landings and departures, and more. Thus, it is worth considering whether such infrastructure could establish a nexus – akin to a permanent establishment – between the recipient of space-derived income and a terrestrial State.

To address these future questions, it is useful to come back to the discussion around the taxation of geostationary satellites. The considerations made regarding

27. RICHNER FELIX/FREI WALTER/KAUFMANN STEFAN/TOBIAS ROHNER, *Handkommentar zum DGB*, 4<sup>th</sup> ed., Verlag Zürcher Steuerrecht, Bern 2023, Art. 6 N 6; LOCHER PETER, *Kommentar DBG – I. Teil*, 2<sup>nd</sup> ed., Helbing Lichtenhahn Verlag, Basel 2019, Art. 6 LIFD N 8.

28. OESTERHELT STEFAN/SCHREIBER SUSANNE, Art. 6 LIFD N 8, in: ZWEIFEL MARTIN/BEUSCH MICHAEL (eds), *Kommentar zum schweizerischen Steuerrecht – Bundesgesetz über die direkte Bundessteuer*, 4<sup>th</sup> ed., Helbing Lichtenhahn Verlag, Basel 2022.

29. LANG MICHAEL, *Introduction to the Law of Double Taxation Conventions*, IBFD, Amsterdam 2010, N 4 ff.

30. HONGLER PETER, *International Law of Taxation*, Oxford University Press, Oxford 2021, p. 22; AVI-YONAH REUVEN, *International Tax as International Law – An Analysis of the International Tax Regime*, Cambridge University Press, Cambridge 2007, p. 5.

31. RUTSEL SILVESTRE MARTHA, *The Jurisdiction to Tax in International Law: Theory and Practice of legislative Fiscal Jurisdiction*, Wolters Kluwer, Boston 1989, p. 202; MALHERBE PHILIPPE, *Introduction to International Income Taxation*, Bruylant, Brussel 2020, p. 36.

32. HONGLER PETER, *International Law of Taxation*, Oxford University Press, Oxford 2021, p. 22.

geostationary satellites can in fact, by analogy, be extended to other objects and infrastructures in space.

## 2. Can an activity in space create a permanent establishment?

### a. The conditions of Art. 5 OECD MC

From the perspective of a double taxation convention, the existence of a permanent establishment is relevant only if a terrestrial State can assert (1) the existence of a permanent establishment; and (2) that the permanent establishment falls under its tax jurisdiction by virtue of a strong economic nexus.

Art. 5 of the OECD Model Convention defines a permanent establishment (PE) as a “fixed place of business through which the business of an enterprise is wholly or partly carried out.” For an establishment to be considered a permanent establishment under international tax law, it must therefore meet four criteria: (1) it must be a place, i.e., it must consist of tangible assets such as facilities, installations, or industrial, commercial, and scientific equipment<sup>33</sup>; (2) it must be fixed, i.e., there must be a link between the place and a specific geographical point, as well as a certain degree of permanence, typically at least 6 months<sup>34</sup>; (3) it must be at the disposal of the enterprise, meaning that the company must have at least effective – though not necessarily legal – control over its use<sup>35</sup>; and (4) it must serve as a medium through which the business is carried out, i.e., this place must contribute to the realization of the company's profit and be operated by the entrepreneur or by persons employed by him<sup>36</sup>.

This means that to qualify as a permanent establishment, any infrastructure in space – from satellites to orbital hotels to asteroid mining facilities – must meet these four conditions.

### b. Can geostationary satellites qualify as a permanent establishment?

In the case of geostationary satellites, one could argue that a satellite operating in geostationary orbit is a

tangible asset at the disposal of the satellite operator company (based on ownership or leasing contracts) that can be used to provide key commercial services to society, such as telecommunications, navigation, weather data collection, environmental monitoring, and national security<sup>37</sup>. This means that the satellite is the outlet through which the business is conducted: as the key infrastructure, it significantly contributes to the company's profit. The fact that the business is carried out mainly through automated equipment (as opposed to being carried out by personnel) is not an issue; the human activities necessary for the qualification of a permanent establishment can simply involve “setting up, operating, controlling, and maintaining such equipment”<sup>38</sup>. The commentary notes that the status of a permanent establishment is excluded only in cases where “the enterprise merely sets up the machines and then leases the machines to other enterprises<sup>39</sup>”. It follows that even if a satellite is not physically maintained by individuals in space – but more likely by machines – it can still be considered a PE, as the involvement of physical persons in its operation takes different forms, such as a team on Earth or in a space colony that monitors data from the satellite, decides when to send technology to repair it, or when to move it from the path of space debris.

Finally, we consider that a geostationary satellite can be considered “fixed” under the Model Convention. This is due to the unique characteristics of the orbit on which these satellites are positioned. The geostationary orbit is a circular orbit at an altitude of 35,786 km above the Earth and is characterized by an orbital period identical to the Earth's rotation time (24 hours)<sup>40</sup>. This means that any object placed in this orbit is constantly above the same point on the planet – i.e., the same country – in such a way that it appears “fixed” in the sky when observed from Earth<sup>41</sup>.

33. SKAAR ARVIN, *Permanent Establishment – Erosion of a Tax treaty Principle*, Wolters Kluwer, Deventer 1991, p. 123.

34. OECD MC Commentary, art. 5 N 21; REIMER EKKEHART, Art. 5 OECD MC, in: REIMER EKKEHART / RUST ALEXANDER (eds), *Klaus Vogel on Double Taxation Conventions – Volume I*, 5<sup>th</sup> ed., Wolters Kluwer, Netherlands 2022, N 50.

35. SASSEVILLE JAQUES/ SKAAR ARVIN, *Is There a permanent Establishment? General Report*, *Cahiers de droit fiscal international (CDFI)*, 94a/2009, pp. 35 f.

36. FLICK HANS/WASSERMAYER FRANZ/WINGERT KARL-DIETER, *Doppelbesteuerungsabkommen Deutschland-Schweiz: Steuern vom Einkommen und Vermögen Nachlass- und Erbschaftssteuern: Kommentar*, Helbing Lichtenhahn Verlag, Cologne since 1981, Art. 5 N 24.

37. World Economic Forum, *Space: The \$1.8 Trillion Opportunity for Global Economic Growth – Inside Report*, April 2024, p.

38. OECD MC 2017, Art. 5 N 41; BÉNARD MARC/BERDOZ DENIS/ BOURTOURAUPT PIERRE-YVES, Art. 5 OECD MC, in: DANON ROBERT / GUTMAN DANIEL / OBERSON XAVIER / PISTONE PASQUALE (eds), *Modèle de convention fiscale OECD concernant le revenu et la fortune – Commentaire*, Helbing Lichtenhahn Verlag, Basel 2014, N 30.

39. OECD MC 2017, Art. 5 N 41.

40. GOROVE STEPHEN, *The Geostationary Orbit: Issues of Law and Policy*, *The American Journal of International Law* 73/1979, p. 445; see also: International Telecommunication Union (ITU), *Radio Regulations*, Edition of 1976, RR1-18, N 84BFA and 84RG.

41. PUTRO YARIES M./NUGRAHA RIDHA A./NUGRAHA TAUFIK R., *Geostationary Orbit Slot Reconceptualization in Accommodating the South*, *Indonesian Journal of International Law* 19/2022, p. 376.

### c. Is such permanent establishment situated in a source State?

While it is plausible that a satellite meets the conditions to be considered a permanent establishment under the OECD or the UN Model Convention, it remains to be seen whether a (terrestrial) State can claim that it is located therein (Art. 6(1) OECD MC). This question is closely linked to the issue of whether a State can extend its tax jurisdiction into space. To invoke an economic nexus, it is in fact necessary that the economic activity has a sufficiently close connection to the source State<sup>42</sup>.

In 1973, eight equatorial States (Colombia, Brazil, Ecuador, Kenya, Congo, Uganda, Indonesia, and Zaire) signed the Bogotá Declaration<sup>43</sup>. In this convention, these States claimed the right to extend their national sovereignty to the geostationary orbit<sup>44</sup>. Their argument was based on the fact that, since the existence of the geostationary orbit is exclusively linked to the gravitational phenomena generated by the Earth, this orbit should not be considered as outer space but rather as an extension of our planet<sup>45</sup>. For this reason, the equatorial States believed that the segments of the geostationary orbit located above their territories should be considered as national territory, over which the State could exercise its national sovereignty, including its tax jurisdiction<sup>46</sup>.

This sort of requalification of the geostationary belt is legally significant. The Outer Space Treaty – considered the cornerstone of international space law – states in Article 2 that “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means”. Since the geostationary orbit (like all orbits) was considered a natural resource of space<sup>47</sup>, the principle of non-appropriation enshrined in the Outer Space Treaty would have indeed prevented the establishment of national sovereignty over the geostationary orbit<sup>48</sup>. On the other hand, if the geostationary orbit

were not considered part of space, it would be a resource over which national sovereignty – including tax jurisdiction – could be extended.

This position was definitively rejected by the international community when, in 2000, the Czech delegation presented a report within the framework of the Committee on the Peaceful Uses of Outer Space (COPUOS), which discredited the arguments of the States that signed the Bogotá Declaration<sup>49</sup>. As a consequence, it is now internationally recognized that the principles of the OST governing space also apply to the geostationary orbit. It is therefore impossible for the State over which a geostationary satellite orbits to argue that this satellite constitutes a permanent establishment within their territory.

This position is also supported by the OECD Model Convention commentary, which notes that “no member country would agree that the location of these (geostationary) satellites can be part of the territory of a Contracting State under the applicable rules of international law and could therefore be considered to be a permanent establishment situated therein”<sup>50</sup>. While asserting that no State wishes to extend its sovereignty on space natural resources might be somewhat of a stretch, it is certain, for now, that such an action would be contrary to public international law.

### d. Can a satellite’s footprint qualify as a permanent establishment?

More recently, some States – primarily India – have argued that if a geostationary satellite cannot be considered a permanent establishment because Article 2 of the OST prevents extending territorial sovereignty to Earth’s orbits, no principle of public international law prevents its footprint (i.e., the area over which a satellite’s signals may be received) from being treated as a permanent establishment within the territory of the State over which the geostationary satellite orbits.

Proponents of this position argue that the footprint of a satellite not only falls (at least partially) within national space but is also “fixed,” thereby establishing a sufficient temporal and geographical nexus with the State directly beneath the satellite. Additionally, they believe that geostationary satellites are a means that can be “used for commercial purposes,” which

42. REIMER EKKEHART, Art. 5 OECD MC, in: REIMER EKKEHART / RUST ALEXANDER (eds), *Klaus Vogel on Double Taxation Conventions – Volume I*, 5<sup>th</sup> ed. Wolters Kluwer, Netherlands 2022, N 18.

43. ARENALES-VERGARA, *Colombia: reasons to create a national space agency*, *Advances in Space Research* 34/2004, p. 2210.

44. GOROVE STEPHEN, *The Geostationary Orbit: Issues of Law and Policy*, *The American Journal of International Law* 73/1979, p. 450.

45. Declaration of first Meeting of Equatorial Countries, Adopted on December 3 1976, p. 2 (accessible at [https://www.root.ps/download/ASM/dec\\_bogota.pdf](https://www.root.ps/download/ASM/dec_bogota.pdf)).

46. *Ibidem*.

47. MCDUGAL MYRES, *The Emerging Customary Law of Space*, *Northwestern University Law Review* 58/1963, p. 618 ff.

48. KOPEĀ RAEĀ<sup>3</sup>, *Geostationary Belt – State’s Territory or Province of Mankind?*, *Review of Nationalities* 8/2018, p. 170; GOROVE

STEPHEN, *The Geostationary Orbit: Issues of Law and Policy*, *The American Journal of International Law* 73/1979, p. 449.

49. MARTHA MEJÍA-KAISER, *The Geostationary Ring*, Brill, Boston 2020, p. 105; KOPEĀ RAEĀ<sup>3</sup>, *Geostationary Belt – State’s Territory or Province of Mankind?*, *Review of Nationalities* 8/2018, p. 171.

50. OECD MC Commentary (2017), Art. 5 N 27.

means they are a medium through which the satellite operator's business (such as telecommunications) is wholly or partly carried out<sup>51</sup>.

The OECD committee does not share this view. In particular, the committee has expressed doubts about the possibility of considering “the particular area over which a satellite's signals may be received (...) at the disposal of the operator of the satellite”<sup>52</sup>.

Despite this, India maintains its position, expressed in the form of a reservation in the OECD commentary. However, to date, none of its national courts have resolved a single case in favor of this interpretation<sup>53</sup>.

### 3. A new nexus: the national registration

As previously mentioned, Art. 2 OST states that “outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.” At the same time, Art. 8 OST stipulates that “A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.” Therefore, despite Art. 2 OST designs outer space and its resources as an area “not subject to national appropriation by claim of sovereignty”, Art. 8 OST simultaneously allows the State of registry to exercise its jurisdiction over the registered space object and space personnel.

As Stephan Mick and Bernhard Schmidt-Tedd correctly point out, the term “jurisdiction” represents an element of sovereignty and encompasses the rights and powers to exercise legislative, judicial, and administrative authority over personnel and objects in outer space and celestial bodies<sup>54</sup>. This perspective also aligns with the traditional interpretation of the concept of jurisdiction in international law<sup>55</sup>. This means that, according to Art. 8 OST, the State of

registry may possess the authority to establish and enforce taxes on objects and personnel located in outer space.

In the context of income taxation, however, general international law imposes a limitation on a State's tax jurisdiction, specifically the requirement of a qualifying connection, often referred to as a “nexus” or “genuine link,” between the State asserting its taxing authority and a specific set of facts relevant to the taxation<sup>56</sup>. In light of these considerations, one might wonder whether the registration of a space object in the national registry could establish a sufficient nexus (genuine link) for the registry State to claim the right to tax the income generated through the object in space and/or by the space personnel. In such a scenario, there would be two States that, based on their national laws, could claim the right to tax space income: on one hand, the residence State of the personnel or the company exploiting the space object, and on the other hand, the State of registry acting as the source State. Were such a solution desirable, an amendment of the double taxation convention existing between these two States would be inevitable, as would be further juridical research in this field.

## Conclusions

Space commerce is undergoing rapid evolution, with an increasing number of enterprises preparing to explore this final frontier of humanity and embark on ever more ambitious commercial ventures. The space economy is poised to become a market of significant size and, more importantly, one that is potentially extremely lucrative. Just as with the digital economy, States will undoubtedly seek to claim their share of the tax pie. However, the taxation of space activities presents unique legal challenges. The space economy, in fact, develops within an international legal framework that was not designed to facilitate commercial activities. The use of space is subject to principles of public international law, such as the non-appropriation principle enshrined in Art. 2 OST, which places pressure on the current international tax system, based on the concepts of “residence” and “source.”

In general, it can be asserted that in space, taxation is primarily tied to the domestic law of the State of residence. This principle applies both to the

51. OECD MC Commentary (2017), Positions on Art. 5 N 43.

52. OECD MC Commentary (2017), Art. 5 N 27.

53. In this regard: Delhi High Court, *Asia Satellite Telecommunications Co. Ltd. versus Director of Income Tax*, rendered on 31 January 2011; Delhi High Court, *New Skies Satellite BV*, rendered on 8 February 2016.

54. MICK STEPHAN / SCHMIDT-TEDD BERNHARD, Art. 8 OST, in: HOBE STEPHAN / SCHMIDT-TEDD BERNHARD / SCHROGL KAI-UWE (eds) *Cologne Commentary on Space Law – Outer Space Treaty*, Berliner Wissenschafts-Verlag, Cologne 2009, N 46.

55. SIMMA BRUNO / MÜLLER ANDREAS, *Exercise and Limits of Jurisdiction*, in: CRAWFORD JAMES / MARTTI KOSKENNIEMI (eds), *The Cambridge Companion to International Law*, Cambridge University Press, Cambridge 2012; RYNGAERT CEDRIC, *Jurisdiction in International Law*, 2<sup>nd</sup> ed., Oxford University Press, Oxford 2015.

56. GAD O STJEPAN, *The Principle of 'Nexus' or 'Genuine Link' as a Keystone of International Income Tax Law: A Reappraisal*, Intertax 46/2018, p. 199.

determination of tax residency and to the taxation of business income.

Regarding residency, the authors consider that it is currently impossible to obtain tax residency in space, as space is not recognized as the territory of any State. Consequently, the tax status of a person in space continues to depend on the legal system of their home State. If, for example, national legislation stipulates that a person is considered a resident only if they meet specific criteria, such as domicile or a qualified stay, once these criteria are no longer met – as it happens when a person physically leaves Earth to go into space – his individual may lose their tax residency and, with it, the obligation to pay taxes in that State. However, it is important to consider that domestic law may include provisions that condition the loss of tax residency on the acquisition of a new residency in another State. In such a case, the individual would continue to be considered fiscally resident in their home State, despite their physical presence in space.

As for business income, the legal basis for taxation hinges on the existence of a sufficient nexus between the income and the State claiming the right to tax. While such a nexus is clear for the State of residence, it is conceivable that with the development of the space economy, States may begin to claim the

existence of other types of nexuses in space and, in parallel, assert their status as a source State. This phenomenon is not merely hypothetical: some equatorial and developing States have already attempted to claim taxation rights over income generated in space, initially by seeking to extend their territorial sovereignty to the geostationary orbit, and subsequently by characterizing the footprint of a geostationary satellite as a permanent establishment situated within their territory.

However, in both cases, this position has been rejected: although the existence of a permanent establishment in space might be plausible, it is more challenging for a State to argue that such an establishment is “situated within its territory” under Art. 7(1) OECD MC. Consequently, even if a State were to successfully establish an (economic) nexus with space income, the existence of a double taxation convention with the State of residence would result in the allocation of taxing rights exclusively to the State of residence. Nonetheless, the State of residence might have unilateral and unconditional exemptions for “income derived from abroad” within its domestic law. In such a case, it is necessary to consider whether the term “abroad” extends to cover income derived from space, or whether it should be confined to income originating from another country.