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SELLING WATER SOURCED IN SPACE? YOU STILL OWE TAXES TO UNCLE SAM OR PADRE MIGUEL HIDALGO* IF BASED IN THE UNITED STATES OR MEXICO, RESPECTIVELY.

Ulisses Meneses Ortiz
umeneses@chicagobooth.edu

ABSTRACT

This paper gives insight into what businesses and governments should expect as we enter the age of space commercialization - wherever profits are found, taxes are sure to follow! Investors, entrepreneurs and governments should be interested in knowing what the expected after- income tax proceeds of investing in space will be. This knowledge helps better assess the risks and rewards of space investments. As an example, I analyze income taxes on the sale of water extracted from a celestial body for use in space. I will compare the sales from the perspective of hypothetical single corporations residing in the United States and Mexico that sell water within their respective countries. The United States passed laws acknowledging the property of resources extracted from celestial bodies. Mexico is an example of the absence of space-specific property rights. In conclusion, this study concludes that recovery of resources in space is taxable, that from a US perspective property rights have no bearing in the tax burden, but they do from a Mexican perspective, and provides insights on issues related with setting up an income tax-efficient legal structure, value creation through tax rules, tax policy responses to tax income created from space activities, and the industry's potential to deepen economic differences within humanity.†

* Don Miguel Gregorio Antonio Ignacio Hidalgo-Costilla y Gallaga Mandarte Villaseñor, ("Miguel Hidalgo"), a catholic Priest, is known as the father of Mexican independence because he led the first revolt against Spanish rule in Mexico.

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SUMMARY

This paper reached the following conclusions.

1. The United States and Mexico do tax revenues from space-based resources because both countries demand their domestic companies to accrue all their income regardless of the source of wealth.
2. Property rights as stated make the sale of space-recovered resources legal for US companies.
3. Tax planning can add significant value. Compared to the US federal income tax rate, the Mexican income tax rate is 9% higher. The extra rate reduces the value of the hypothetical project by approximately 7.60 percent of value. From a pure income tax perspective, the recommendation would be to concentrate as much income in the jurisdiction with the lowest income tax rate. This conclusion is however a partial conclusion. In general, there are three tax levels: federal, state, local. Within each, one can have direct and indirect taxes and one needs to carefully assess the impact of the other tax burdens before reaching a conclusion. Thus, the general lesson is to execute a comprehensive tax model, instead of basing the decision on income tax differentials only.
4. Mexico's legal framework has most of the infrastructure required to provide property rights for resources recovered in space. But, because of the accession to the Moon Treaty, Mexico i) renounced property rights for space resources, ii) granted these property rights to an unnamed and to-be-created supra-national entity, and iii) accepted an additional tax on its citizens. This situation creates a disincentive for companies to invest in space mining and locate themselves in Mexico.
5. Mexican companies interested in space mining must locate outside of Mexico. In principle, by using international transactions, Mexican companies can access both a more favorable legal environment and a lower tax burden.
6. For the Mexican government, the main policy conclusions are two:
    a. Denounce the Moon Treaty using its sunset provisions:
        i. Ten years after the entry into force […] the questions of the review […] to consider, in light of past application […] whether it requires revision.
        ii. Any State Party may give notice of its withdrawal […] shall take effect one year from the date of receipt […].
    b. Update property rights to reflect the possibility of recovering resources from the moon, using the US or Luxembourg law's as models. US law is the most comprehensive, but Luxembourg law uses Civil law, just like Mexico.
7. In the new space age, the spirit of the Moon Treaty and the Outer Space Treaty raise an issue beyond profit: given the current disparities in the world, a portion of the world's population would be privileged to enjoy most of the profits from the endless resources of space. If this situation is left unaddressed, the new space age has potential to deepen socio-economic inequalities to a level never seen before, especially in countries with overage of unskilled labor and weak rule of the law.

INDUSTRY BACKGROUND AND JUSTIFICATION

Industry background

The private space industry is growing and it has the potential to transform the world. The Organization for the Economic Cooperation and Development ("OECD"), an intergovernmental organization in which governments discuss policy issues,[1] mentions on its Space and Innovation Report ("Space and Innovation Report") that the space sector "seems to be in the verge of a new cycle on its development".[2] Indeed, according to Bryce Space and Technology's "Start Up Space" report ("Bryce report")[3], investments by the private sector have grown exponentially in the period covered from 2000 to 2017. Specifically, private investments in the space sector in the periods 2000-2005, 2006-2011 and 2012-2017 were approximately USD 1.1 billion, 6.7 billion, and 10.6 billion, respectively. As a measure of the growth, 2012-2017's investment was 9.6x larger than 2000-2005's and 1.6x larger than 2006-2011.[‡] Total investment from 2000 to 2017 is thus, approximately 18.419 billion, of which 12.9 billion refers to equity-like investments.[4]

Within the space sector, mining of space resources is now becoming a viable venture: "asteroid mining is quickly becoming a viable niche industry within the commercial space landscape"[5]. Nonetheless, while most of the attention on space resources mining is provided to the technological feasibility and property rights, the business background of space mining has been not been addressed with the same intensity by the existing literature. A topic in which the literature is silent relates to the tax effects of space mining. Specifically, what are the tax burdens associated with the recovery of the resources in space, if any. Would the fact that the recovery is legal (or not) change the tax burden? Can investors increase the value of their companies through tax tools? Finally, are the United States and Mexican governments positioned to recover their fair share of taxes once the industry takes off?

First, I address why taxes matter; then I provide comments on existing literature. Then, I provide a case with stylized facts, and then I analyze the tax consequences, whether the sale would be legal from the jurisdiction perspective and finally, whether the actual tax rate can be lowered. I use the United States and Mexican frameworks for this analysis. The United States is relevant because it has passed laws acknowledging legal title of space resources. Mexico is used as an example of a country that has not passed laws acknowledging legal title of space resources. I then provide the policy lessons from the point of view of both governments and corporations. These can be used as a blue print on creating a tax efficient legal structure.

Justification - why taxes matter

In any investment, there are two major parties. Investors and governments. Investors can provide capital to companies through two main instruments: Debt and equity. Usually, in return for their cash debt holders receive a contract with a promise of payment of the principal plus a specified interest rate. Equity holders have access to the cash flow of the companies once debt holders have been paid; thus, debt holders have preference on access to cash flows compared to equity holders. Hence, if things go well, equity investors are poised to have all the gains beyond the interest rate, and if things go bad, they are the first in line to take losses.

Governments are investors that provide public goods for the investment to develop. Owens and Parry (2009) explain: "tax is more than just a source of revenue and growth. It also plays a key role in building up institutions, markets and democracy through making the state accountable to its taxpayers. Just as excessive tax burdens might hinder growth in wealthier countries, in developing economies a lack of tax structures is a major cause of weak, unresponsive governance. It also leads to an overreliance on aid. With tax, the public can hold governments to account for their decisions, and not feel tied to the will of aid donors. And because tax revenues are relatively

‡ This investment volume is remarkable, because investment kept incoming to the sector even though in 2008-2011 the world suffered one of the largest financial crises in living memory.

predictable, governments can plan ahead with greater certainty." Thus, tax revenue is the lifeblood of any country.

When government and investors meet, unfortunately, they have opposite incentives. From an investors' perspective, governments are a forced investor that cannot be excluded from the profit pool as that would be tax avoidance. Governments have lower preference than debt holders do in access to cash flow, because taxes are paid after interest expenses, but higher preference than equity holders do, as dividends are paid from after-tax profit. If things go well, the government's profit is capped to a percentage of the profits; if things go bad, the government takes no tax revenue and defers the tax payment until the company is profitable again. Once investors have recouped prior lost income (e.g. covered past losses), the company can declare profits and payout dividends. Government are in the opposite situation – they need to provide services that would not be provided otherwise, such as investing in highly risky space exploration, roads, national parks, etc., and thus it is required to force people into paying out to sustain its services.

So, because governments are a forced preferred shareholder, an equity investor holder needs to consider the effects of the tax burden associated with recovering and commercializing resources from space, because a higher / lower tax burden can significantly change the cash flows available to equity investors and thus change the decision of whether to invest/not invest in the project. This is particularly important for investments in the private space industry, as the tax burden can reduce or increase the net present value of companies, because it can increase or reduce the amount of cash flow available for equity investors.

BACKGROUND PAPERS

The literature is silent on the topic of the tax burden associated with resources recovered from celestial bodies. Nonetheless, I found three papers that were reasonably close to space law and space-related issues. First, Krugman (1978) wrote a paper on interstellar trade.[6] Krugman (1978) was mostly concerned with "how should interest charges on goods in [interstellar] transit be computed when the goods travel at close to the speed of light". Second, March and Paladino (1984) published a report on a tax case of Communications Satellite Corporation versus the Franchise Tax Board[7]. In the case, the state of California determined the income attributable to the state of California using a formulary apportionment[§] that included the value of satellites and the income received by Comsat by their use. Third, Chodorow (2009)[8] builds on Krugman (1978) and discusses if and how income earned in an interstellar flight should be taxed. While these papers are seminal in their own right, they do not address the tax consequences of mining resources in the moon or a celestial body within the solar system, which is the purpose of this paper. To analyze the tax consequences, we first need a case, next.

MINING RESOURCES IN SPACE – STYLIZED FACTS

A corporation, Interstellar Water Supply ("IWS"), expects to mines ice from the moon, from which it would derive water. Currently, the market pays approximately 10,000 USD per kilo of ice, delivered in low earth orbit, regardless of quantity. IWS expects to sell 10,000 kilos during the first year of operations, so the expected revenue is around $100 million USD. IWS incurs costs related to human personnel controlling the mining equipment from earth, the costs of transportation for equipment from the manufacturing sites to the moon, and transportation cost for the water from the moon to low earth orbit, fuel, and electricity. IWS expenses include selling expenses, administrative overhead, including the CEO, and C-suite officers, accountants and office space. IWS expects to earn around 60 cents on each dollar as operating profit, other income and expenses are zero and is financed entirely with equity. IWS has a cost of equity of 50%, and 100,000 shares outstanding.

[§] A formulary apportionment can be thought of assigning taxable profits using a formula to measure activity. For example, if company Z operates in jurisdictions A and B, and 20% of the assets of Z are in B's jurisdiction, then under the formulary apportionment, B would claim 20% of the pretax profit for its jurisdiction. In the case under discussion, California included the value of the satellites as assets within California, and thus was able to claim a higher taxable base than if the satellites were not included.

Now, we are ready to check whether IWS has tax burdens associated with the recovery of resources in space, if any, on whether fact that the recovery is legal (or not) change the tax burden, if investors increase the value of their companies through tax tools, and lastly, if the United States and Mexican governments positioned to recover their fair share of taxes once the industry takes off.

We start by reviewing who has the power to enact taxes.

TAX BACKGROUND

The Joint Explanatory Statement ("JES 2007") assembled a great overview of taxation principles from several sources.[9] The JES 2007 explains: "international law generally recognizes the right of each sovereign nation to prescribe rules to regulate conduct with a sufficient nexus to the sovereign nation. The nexus may be based on nationality of the actor, i.e., a nexus between said conduct and a person (whether natural or juridical) with a connection to the sovereign nation, or it may be territorial, i.e., a nexus between the conduct to be regulated and the territory where the conduct occurs. For example, most legal systems respect limits on the extent to which their measures may be given extraterritorial effect. The broad acceptance of such norms extends to authority to regulate cross- border trade and economic dealings, including taxation". Taxation is thus part of the norms that each nation is commonly accepted to have. The compilation of these norms can be found in the constitution of each jurisdiction – these constitutions set up the legal norms by which the subjects of the jurisdiction decide to abide themselves. In the case of the United States, the United States Constitution states "The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration."[10] In Mexico, the Mexican Constitution states that "The Congress has the faculty to […] impose contributions required to meet the budget"[11] and "to establish contributions […] on foreign trade; […] natural resources;…"[12]. Thus, the power to dictate norms related to tax in both the United States and Mexico is granted to their respective Congressional bodies by their respective Constitutions.

Constitutions provide the main legal framework in which subjects of a jurisdiction operate, and leave details on their application to secondary law. From a United States perspective, the second and level of law is embodied in the United States Code. The United States Code is the codification by subject matter of the general and permanent laws of the United States.[13] Underneath the United States Code is the Code of Federal Regulations ("CFR"), which is the body of regulations associated with each section of the US Code, and provides further details in the implementation of the norms included in the United States Code. Tax issues are dealt in Title 26 of the United States Code ("US Code").

In the recent past, tax law treated differently domestic companies[**] relative to foreign companies (e.g. companies not registered in the United States). Specifically, domestic companies had to pay at least the tax amount as required by the United States for all their universal income (e.g. income from "whatever source derived"), whereas foreign companies paid only taxes on the income generated within the United States. For domestic companies the US Government would credit taxes paid to foreign governments up to the total US tax liability times adjusted by the ratio of taxable income from sources outside the US to taxable income without US + foreign sources in order to avoid double taxation.[14] One of the major changes of the TCJA was that domestic companies in general, may be able to effectively pay United States taxes only on income generated in the United States. The treatment for foreign companies is a bit different. Cassidy (2010) mentions that "Foreign corporations are subject to United States taxation on two broad classes of income: investment income from United States sources and income that is effectively connected to a United States trade or business. Investment income consists of interest, dividends, rents and royalties, and similar types of income from passive investments. This income is taxed on a gross basis at a flat rate of tax and is subject to source withholding. It also includes gains from the sale of assets that give rise to investment income. These gains are subject to United States tax to the extent that they

[**] A domestic company is a company registered under the jurisdiction of the United States

are derived from United States sources. "[…] A foreign corporation's business income is subject to tax in the United States to the extent that it is considered to be effectively connected to a United States trade or business. Income that is effectively connected to a United States trade or business is subject to net taxation at graduated tax rates—similar to United States corporations."[15]

In the case of Mexico, the second level of law related to laws issued to address a specific issue and absent a specific law, the codes fill in the gaps. The relevant law for us is the Income Tax Law ("ITL"), and the relevant codes are the Mexican Civil Code ("MCC") and the Mexican Federal Fiscal Code ("FFC"). Each Mexican law and Mexican codes have their own associated regulations. Both, Mexican headquartered companies and Non-Mexican headquartered companies have largely the same tax duties under Mexican law as related to income generated in Mexico.

In general, there are three tax levels: federal, state and local. Within each, one can have direct and indirect taxes and taxes. These taxes vary widely depending of each jurisdiction – for example, Mexico charges Value Added Tax, a consumption based tax, but has no sales tax, like the United States. In the United States, States can charge income tax, whereas in Mexico, States get revenues from federal income taxes. For this paper, I focus on income tax because this tax is applied consistently in most countries of the world. Therefore, any references to tax, are references to income tax, unless repugnant to the context.

Now that we know where to look for the tax effects and have a bit of background, we can finally begin!

A US PERSPECTIVE

Tax consequences

I approached this question in two ways. The first way ("Approach A") is to review who pays taxes, and see if space activities are taxed or not. The second approach ("Approach B") is to look up in the US Code for space-specific references and reverse engineer the references.

Approach A

In Approach A, the conclusion is straightforward: income related to space activities is clearly taxable. The US Code § 11(a) explains: "A tax is hereby imposed for each taxable year on the taxable income of every corporation." The definition of taxable income is provided by US Code §63(a), "gross income minus the deductions allowed by this chapter (other than the standard deduction)". Under our case, we do not need to worry about the standard deductions, as they are designed for individuals - and IWS is a corporation. US Code §61(a) explains gross income: "means all income from whatever source derived, including (but not limited to) […]". Thus, income from space activities would be included in gross income as there are no distinctions related to the source. As per the deductions, US Code §162(a) explains: "there shall be allowed as a deduction all the ordinary and necessary expenses paid or incurred during the taxable year in carrying on any trade or business…". I assume that all the deductions of IWS are ordinary and necessary, and thus can be taken.

We now have USD 100 million of gross income, USD 40 million of deductions, and a taxable income of USD 60 million. Finally, the tax rate is provided by US Code §11(b): "The amount of the tax imposed […] shall be 21 percent of taxable income." Thus, we end up paying USD 12.6 million (USD 60 * 21%) to Uncle Sam.

Approach B

Under Approach B, looking up for space related references, we learn that the US Code does include tax regulations related to space.

US Code § 863 (d)(1)(A) states that "any income derived from a space or ocean activity, <u>*if derived by a United States person*</u>, shall be sourced in the United States", and –(B) explains: "if derived by a person other than a United States person, shall be sourced outside the United States. US Code § 863(d)(2)(A)(i) defines a space activity as "any activity conducted in space". These definitions imply that the approach of taxation to the sales of IWS's water would depend on whether IWS is considered a US person or not: if IWS is a US person, then the income would be deemed to have been generated in the United States; alternatively, if IWS is not a US person, then the income would've been generated outside of the United States. Therefore, it is important to be able to distinguish between these two types of persons, as the tax consequences are different depending on the type of person at issue.

So now, we need to define a "person". US Code §7701(a)(1) explains the term "person": "[…] mean[s] and include[s] an individual, a trust, estate, partnership, association, company or corporation." Thus, the term "person" includes corporations (e.g. IWS). Now, which corporations are United States persons? US Code §7701(a)(30) explains the term "United States person" : […] (C) a domestic corporation […]". Therefore, IWS might qualify as a US person if it qualifies as a domestic corporation.

US Code § 7701(a)(4) explains: "…."domestic" when applied to a corporation or partnership means created or organized in the United States or under the law of the United States or of any State unless, in the case of a partnership, the Secretary provides otherwise by regulations." Just for sanity, US Code § 7701(a)(9) also explains: "the term "United States" when used in a geographical sense includes only the States and the District of Columbia."

We are finally ready to conclude on what is a US person. If the investors create, organize or base the corporation in or under the jurisdiction of the United States or any of its States, then such corporation would be a US person. In essence, if the company is registered before the United States government or operates in the territory of the United States, then is a US person. Since under the assumptions, IWS will be registered in the territory of the United States, it would be a domestic corporation, and thus, a US person.

Now we are ready for the second part of the sentence, "any income derived from an activity conducted in space, if carried out by a US person, *<u>is deemed as have been sourced in the United States</u>*" So, IWS' income is income from a US person, and thus is deemed to have been sourced within the US. Now, we address the second part of the sentence and see what happens with income sourced in the United States.[16]

So now what? We need a bit more detail, and thus, we refer to the CFR. CFR 1.863-8 deals with the source of income from space and ocean activities. Let us see what it has to say.

CFR § 1.863-8(b)(1) reiterates what we already know: "Space and ocean income derived by a United States person is income from sources within the United States"; but gives a bit more of detail: "However, space and ocean income derived by a United States person is income from sources without the United States to the extent the income, based on all the facts and circumstances, is attributable to functions performed, resources employed, or risks assumed in a foreign country or countries." In English, if the income is generated from a US person, such income is generated within the United States, and is taxable by the United States. However, if there is a joint effort, income from space might be sourced from outside the United States to the extent that functions, assets and risk are assumed in a foreign country. This might mean that if risks are assumed outside of the United States, some space income can be shifted to a lower tax jurisdiction. Good to know!

Additionally, CFR § 1.863-8(b)(2)(i) and –(ii) discusses on what happens when we are dealing with a foreign person:

- CFR § 1.863-8(b)(2)(i): "Space and ocean income derived by a person other than a United States person is income from sources without the United States, except as otherwise provided in this paragraph (b)(2)";
- CFR § 1.863-8(b)(2)(ii): "Space and ocean income derived by a controlled foreign corporation within the meaning of section 957 (CFC) is income from sources within the United States. However, space and ocean income derived by a CFC is income from sources without the United States to the extent the income, based on all the facts and circumstances, is attributable to functions performed, resources employed, or risks assumed in a foreign country or countries."

Just to have all the definitions in one place, let us see the definition of controlled foreign corporation. According to US Code § 957, the term controlled foreign corporation is "any foreign corporation if more than 50 percent of—(1) the total combined voting power of all classes of stock of such corporation entitled to vote, or (2) the total value of the stock of such corporation, is owned […] by United States shareholders […] of such foreign corporation".

In plain English, CFR § 1.863-8(b)(2)(i) and –(ii) explains: if the person is a foreign person, then the space income is generated outside of the United States, unless the foreign person happens to be a subsidiary or owned by US shareholders. If the foreign person is owned by US shareholders, then, the income becomes again US sourced income BUT if such foreign person (a double negative!) realizes functions, uses its own resources and bears risks, income would be sourced outside of the United States, and thus scape US taxation.

As per regulations specific to ice, turns out that we have specific regulations. CFR § 1.863-8(b)(3)(ii) provides rules for sales of property produced by the taxpayer. CFR § 1.863-8(b)(3)(ii)(A) explains: "if the taxpayer both produces and sells such property, the taxpayer must allocate gross income from such sales between production activity and sales activity under the 50/50 method. Under the 50/50 method, one-half of the taxpayer's gross income will be considered income allocable to production activity, and the source of that income will be determined under paragraph (b)(3)(ii)(B) or (C) of this section. The remaining one-half of such gross income will be considered income allocable to sales activity, and the source of that income will be determined under paragraph (b)(3)(ii)(D) of this section." In essence, the regulations are creating an income statement by allocating income across different categories, so that then one can allocate the associated expenses, and calculate taxable income.

Before we continue, we should check what "production" is. CFR § 1.863-8(d)(2)(i) defines: "production activity means an activity that creates, fabricates, manufactures, extracts, processes, cures, or ages property[…]". So, here it is. The extraction of ice from the moon meets this definition, as according to the Cambridge Dictionary, extraction refers to the process of removing a substance from the ground or from another substance.[17] Now that we have defined production to include "extraction", we can see review the 50/50 method.

CFR § 1.863-8(b)(3)(ii)(B) discusses about production only in space whereas –(C) discusses about production both in space and outside space. We can thus focus only in –(B) as IWS's ice is extracted from space and will stay in space. CFR § 1.863-8(b)(3)(ii)(B) states that "when production occurs only in space or international water, income allocable to production activity is sourced under paragraph (b)(1) or (2) of this section, as applicable […]". Hence, we know that production is happening by a US person, IWS, and so the production income is income from sources within the United States.

CFR § 1.863-8(b)(3)(ii)(D) discusses about sales activity: "When property produced by the taxpayer is sold outside space and international water, the source of gross income allocable to sales activity will be determined under §§ 1.861-7(c) and 1.863-3(c)(2). When property produced by the taxpayer is sold in space or international water, the source of gross income allocable to sales activity generally will be determined under paragraph (b)(1) or (2) of this section, as applicable. However, if such property is inventory property within the meaning of section 1221(a)(1) and is sold in space or international water for use, consumption, or disposition outside space, international water, and the United States, the source of gross income allocable to sales activity will be determined under §§ 1.861-7(c) and 1.863-3(c)(2)." IWS will sell ice in space and in principle, the ice will be disposed of in space. Therefore, we can determine the source of gross income as per CFR § 1.863-8(b)(1) and (2). We know all the sales activities are carried out by IWS, and thus, we can conclude that the sales income is income from sources within the United States.

Therefore, as far as gross income is related, it is all income from sources within the United States. Now what? The next step is provided in the Regulations. CFR § 1.863-8(c) explains: "When a taxpayer allocates gross income under paragraph (b)(1), (b)(2), (b)(3)(ii)(C), or (b)(4) of this section, the taxpayer must allocate expenses, losses, and other deductions as prescribed in §§ 1.861-8 through 1.861-14T to the class or classes of gross income that include the income so allocated in each case. A taxpayer must then apply the rules of §§ 1.861-8 through 1.861-14T to apportion properly amounts of expenses, losses, and other deductions so allocated to such gross income between gross income from sources within the United States and gross income from sources without the United States." So, now we should allocate and apportion expenses into each gross income category (e.g. within and without the United States) as per the rules included from CFR § 1.861-8 to 1.861-14T.

CFR § 1.861-8(1) explains: US Code § 861(b) and § 863(a) "state in general terms how to determine taxable income of a taxpayer from sources within the United States after gross income from sources within the United States has been determined. [US Code §] 862(b) and 863(a) state in general terms how to determine taxable income of a taxpayer from sources without the United States after gross income from sources without the United States has been determined. This section provides specific guidance for applying the cited Code sections by prescribing rules for the allocation and apportionment of expenses, losses, and other deductions (referred to collectively in this section as "deductions") of the taxpayer." So, first, in general terms, the US Code § 861(b) and § 863(a) refer to how to determine taxable income from income from sources within the Unites States, which is all we need. If we need more guidance, we can return to CFR § 1.861-8(1).

US Code § 861 provides specific items that need to be included in gross income. These items are interest, dividends, personal services, rentals and royalties, disposition of United States real property interest, sale or exchange of inventory property[18], social security benefits, and guarantees. There is no mention of space related activities, and by virtue of the US Code listing the specific items included in the rule, one can conclude that these space activities are not included here.

US Code § 863(a) has a more comprehensive definition. "Items of gross income, expenses, losses, and deductions, other than those specified in sections 861(a) and 862(a), shall be allocated or apportioned to sources within or without the United States, under regulations prescribed by the Secretary. Where items of gross income are separately allocated to sources within the United States, there shall be deducted (for the purpose of computing the taxable income therefrom) the expenses, losses, and other deductions properly apportioned or allocated thereto and a ratable part of other expenses, losses, or other deductions which cannot definitely be allocated to some item or class of gross income. The remainder, if any, shall be included in full as taxable income from sources within the United States." Thus, one must allocate gross income and expenses as per the regulations, and if we are separating between income from sources within and without the United States, to calculate taxable income, we should deduct expenses that cannot definitely for sure be allocated to gross income without the United States. The difference between the income and expenses is to be included as taxable income from sources within the United States. We know IWS's gross income and expenses of USD 100 million and 40 million respectively, belong to the same activity. Therefore, the taxable income from sources within the United States is USD 40 million.

The USD 40 million taxable income from space activities which is also from sources within the United States falls in US Code § 864(c)(3), other income from sources within the United States: "All income, gain, or loss from sources within the United States (other than [fixed, determinable annual or periodical gains]) shall be treated as effectively connected with the conduct of a trade or business within the United States."

Finally, we can move to the tax burden. US Code § 882(a)(1) states that "a foreign corporation engaged in trade or business within the United States during the taxable year shall be taxable as provided in section 11 or 59A, on its taxable income which is effectively connected with the conduct of a trade or business within the United States." We know that the tax rate is 21% and that taxable income effectively connected with the conduct of a trade or business within the United States is USD 40 million. Thus, the tax burden is $12.6 million.[19] The US Code managed to charge the same amount of tax under Approach 1 and Approach 2. In both cases, the tax amount equals 60 * 21% = 12.6 million for Uncle Sam as long as all the activities are carried out by a single US person. Assuming these profits stay constant at perpetuity and are equal cash flow, the share price would be the net present value of the capitalized profits (USD 47 million / .5 for the cost of equity) divided by the number of shares (100,000) = USD 948 per share.

We can then state our first conclusion. The United States does tax space related activities, even if the recovery and activity of ice happens in space.

Would the legality of the sale have a bearing on the tax burden? Let us find out.

Would the legality of the sale change the tax burden?

There has been a lot of debate about property rights for resources in space. Interestingly enough, tax law is impervious to this debate, as it applies even if the products you are selling are illegally obtained. A bit of background first.

International use of outer space is regulated by the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which entered in force in 1967 ("Outer Space Treaty"). The Treaty was opened for signature by the three depository Governments (the Russian Federation, the United Kingdom and the United States of America). Additional countries, including Mexico, acceded to Outer Space Treaty.

The Outer Space Treaty clearly states that "exploration and use of outer space […] shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind, […], free for exploration and use […]"[20], that "outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means"[21], that "State Parties[††] shall carry on activities in the exploration and use of outer space […] in accordance with international law, in the interest of maintaining international peace and security, and promoting international cooperation and understanding"[22], "…celestial bodies shall be used […] for peaceful purposes"[23]. The Outer Space Treaty also deals on who is in control "States Parties shall bear international responsibility for national activities in outer space […] whether such activities are carried on by governmental agencies or non-governmental entities. The activities of non-governmental entities in outer space shall require authorization and continuing supervision by the appropriate State Party to the Treaty"[24]. Lastly, the treaty discusses behavior in outer space: "In the exploration and use of outer space […] State Parties […] shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities […] with due regard to the corresponding interests of all other State Parties […]".

As one can see, the Outer Space Treaty does not discuss on the extraction of resources, but rather, only prevents countries from claiming sovereignty, and wants participants to be peaceful and respectful of each other's rights. The Outer Space Treaty lays the authority to regulate each participant with its corresponding government. The use of resources is not specifically forbidden, as long as it is executed on a peaceful way and purpose. Further, the Outer Space Treaty is silent on the specific issue of ownership by non-governmental entities. The closest to ownership-issues refers to the State Parties executing authorization and supervision of non-governmental entities. If a state party authorizes a non-governmental entity to use space, a natural extension of the powers vested in the State Party under the Outer Space Treaty is to authorize the recovery and use of resources in outer space.

[††] A State Party is a country signing the treaty.

One could present an argument ("Outer Space Treaty Spirit Argument") against granting property rights, recovery of resources and associated profits by stating that such activities would be contrary to Article I, "exploration and use of outer space shall be for the benefit and in the interests of all countries […]". The logic is that property rights would prevent developing countries with no space capabilities from ever accessing resources in space as by the time they get there, if they ever do, most resources would be already appropriated by a few aggressive explorers. These explorers, by hogging resources, would become extremely wealthy, and would leave nothing for the rest of the world. This would deepen the world's socio-economic inequalities, against the spirit of the Outer Space Treaty, and thus property rights should not be established.

In my opinion, the Outer Space Treaty Spirit Argument is a weak argument because socio-economic inequality cannot be solved by a legal instrument only, in this case the Outer Space Treaty, and because inventions made in developed countries tend to migrate worldwide – thereby extending benefits for all humanity. Examples of these inventions include electricity, internet, and cellular phones, which have and are providing benefits for most people in earth.[‡‡]

The United States addressed legal rights under the Asteroid act. The Asteroid act provides legal rights to space resources, and explains: "A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States".[25] The asteroid act also explains: "asteroid resource" means a space resource found on or within a single asteroid[26], that a "space resource to mean an abiotic resource in situ in outer space"[27], "space resource" includes water and minerals[28], and finally, that the term "United States citizen" has the same meaning as the term "citizen of the United States" in section 50902[29]. Let us see what Section 50902 has to say about citizen of the United States.

Sections 51 of the United States Code § 50902(1)-(A), -(B), (C) explain that a citizen of the United States can have three meanings: first, an individual who is a citizen of the United States; second, an entity organized or existing under the laws of the United States or a State; or third, an entity organized or existing under the laws of a foreign country if the controlling interest (as defined by the Secretary of Transportation) is held by an individual or entity described in sub clause (A) or (B) of this clause. We know that IWS is an entity incorporated under the law of the United States, and thus, we can conclude that it is a citizen of the Unites States. Therefore, it can claim legal ownership of space resources under the Asteroid Act. As far as the US government is concerned, IWS' mining of natural resources in space is legal. Therefore, there are no changes to the prior conclusion.

As a counterfactual, under the US law, illegality would not affect the tax burden. In the case of United States v. Sullivan[30], the United States Supreme Court through Justice Holmes stated, ''We see no reason . . . why the fact that a business is unlawful should exempt it from paying the taxes that if lawful it would have to pay''. Further, necessary expenses would also be deductible: "It is urged that if a return were made the defendant would be entitled to deduct illegal expenses such as bribery." Second, in Rutkin v. United States[31], the United States Supreme Court held that money obtained by extortion is income taxable to the extortioner. In yet a third case, James v United States[32], the United States Supreme Court concluded that embezzled funds are to be included in the 'gross income' of the embezzler in the year in which the funds are misappropriated, and that "has been a widespread and settled administrative and judicial recognition of the taxability of unlawful gains of many kinds,[…] These include protection payments made to racketeers, ransom payments paid to kidnappers, bribes, money derived from the sale of unlawful insurance policies, graft, black market gains, funds obtained from the operation of lotteries, income from race track bookmaking and illegal prize fight pictures".

Thus, even if IWS' profits from sales of water were not legal, from a US point of view, they would have still been taxed. From a tax perspective, legality does not affect the tax liability.

‡‡ Nonetheless, socio-economic inequality is a very important consideration that should not be left behind under the cover of legal arguments.

Persons other than United States persons – or can we lower the tax rate?

If we wanted to lower the tax rate, we would first need a jurisdiction with a tax rate that is less than 21%. Luxembourg is a good candidate because it has property rights for space resources.[33] For the sake of the argument, let us assume that investors decided to establish IWS in the United States ("IWS US"), but choose to have the operations executed by a company located in Luxembourg, ("IWS Luxembourg"). Under this scenario, IWS Luxembourg would do the extraction, provide all the resources required, and bear all the risks associated with the operation. IWS Luxembourg would then sell the ice to IWS US, and in turn, IWS US would sell the water to its end client. IWS US is responsible for the marketing and sales of the water. Once the client decides to purchase the water, IWS US send a purchase order to IWS Luxembourg with delivery instructions. Let us assume that IWS US makes an operating profit of 5% on each dollar sold to the customers. IWS Luxembourg makes a profit on the remainder.[§§]

Now, would IWS Luxembourg be taxed in the US on its space income? What would be the tax effects?

First, we know that IWS US would be taxed on its income regardless of the source, which would be 100 million. Now, most of the work is done by IWS Luxembourg, and thus, IWS US functions are reduced, and consequently, its profit level. The new IWS US profits are USD 5 million instead of USD 60 million. Since there are no other expenses or income, and there is no debt, the taxable income is still USD 5 million. Thus, the tax amount equals 5 * 21% = 1.05 million for Uncle Sam.

Let us see what would be the United States tax effect for IWS Luxembourg.

Since IWS Luxembourg is incorporated as per the rules of the Grand Duchy of Luxembourg, and is not created or organized in the United States or under the law of the United States, then it is not a domestic corporation, and thus, it is a foreign corporation. This leads to IWS Luxembourg to operate under different rules: US Code § 11(d) explains: for foreign corporations "the tax imposed by subsection (a) shall apply only as provided by section 882". Let us see what section 882 is all about.

To start, Code § 882(a)(1) states that a foreign corporation engaged in trade or business within the United States during the taxable year shall be taxable as provided in section 11 or 59A, on its taxable income which is effectively connected with the conduct of a trade or business within the United States. This takes us to a new question – is IWS Luxembourg engaged in trade or business within the United States? If so, what is the taxable income effectively connected with the conduct of a trade or business within the United States?

We start by the first question.

Unfortunately, there is no clear-cut definition of trade or business within the United States. Katz, Plambeck, and Ring ("KPR")[34], explain that the term "trade or business within the United States is used in many different provisions of the [US] Code and regulations, but it has no single comprehensive definition". KPR also explain that the US Code provides special rules applicable to the performance of personal services and trading in securities or commodities. KPR also comments that besides these special rules, "the determination whether a foreign corporation is engaged in a United States trade or business is left to the common law and thus is governed by judicial and administrative determinations. […] whether such a trade or business exists is a question of fact depending on the nature and extent of the foreign corporation's economic activities in the United States."

KPR offers two common law cases to provide insight into what constitutes trade or business, and explains: "a United States trade or business exists if those activities are “considerable, continuous, and regular". Further, KPR

[§§] Profits might be repatriated using dividends. Under the new changes issued in the JTCA, certain dividends received might escape United States taxation. This analysis is complex, so to keep the discussion simple, I only focus on the income tax effects. A complete tax analysis would include tax effects associated with dividend income. Always discuss with a professional before taking any tax decisions, as this paper is not tax advice, rather, only an informative document.

explains: to "In order to constitute a United States trade or business, the activities conducted by a foreign corporation in the United States must as an initial matter be "active."

Alternatively, there are cases in which there is no United States trade or business. KPR explains: these refer to "ministerial, clerical, or collection-related activities, by contrast, generally are not sufficiently profit-oriented to constitute a United States trade or business". In the case of direct sales, KPR explains: "Although no case has directly considered the issue, it seems likely that direct sale of products to United States purchasers, without involvement of a United States office or agent, marketing or direct solicitation activity in the United States, or maintenance of a stock of inventory in the United States, is not a United States trade or business".

IWS Luxembourg does not solicit sales in the United States; rather, IWS US provides the purchase orders. We can thus conclude that it seems that there is no United States trade or business within the United States and thus the taxable income effectively connected with the conduct of a trade or business within the United States is zero.[35] A year goes by, and IWS Luxembourg has made an operating profit of USD 55 million.

Assuming that IWS Luxembourg obtains property of the minerals in space, and sells them in demand to IWS US, the sale would be from an earth-based company to another, and thus it is likely taxable. Under our assumptions, operating profit equals taxable profit, and thus, the income tax burden in Luxembourg equals 18% * USD 55 million.[36] The income taxes paid would then be $9.9 million USD. Thus, IWS Luxembourg would generate after tax profits of $45 million. The total income tax paid in this case is therefore: 1.05 for the US government + 9.9 million for Luxembourg's government = 10.95 million. In comparison, if IWS had kept the totality of its operations in the US, the total tax burden would have been 60 million of operating profit * 21% = 12.6 million. The tax savings on income tax is 1.65 million and the after tax profit is USD 49.05 million. Again, assuming these profits stay constant at perpetuity and that they equal cash flow, the share price would be the net present value of the capitalized profits (USD 49.05 million / .5 for the cost of equity) divided by the number of shares (100,000) = USD 981 per share; the increase of the Net Present value is around 3.3 million. We have increased the value of IWS using tax regulations.

If the tax differential is large enough, there might be a possible benefit of locating part of the operations and economic substance into lower tax jurisdictions.[***]

MEXICAN PERSPECTIVE

Tax consequences

So, now, let us see what happens when you do not have space property rights clearly stated in your laws. Let us assume that IWS is a corporation located in Mexico, and everything else is the same. Would Mexican Tax legislation tax income generated from sales of assets located in space? Yes/no and why? If yes, what is the tax consequence from a corporate tax point of view in the taxable jurisdiction? Moreover, can we lower the income tax rate somehow?

Mexican background

The Mexican space industry started in 1962, under the guidance of the National Outer Space Commission of ("NOSC"), a body of the Mexican government. NOSC had some successes in terms of rocketry [37], probably more than the economic policy of the time. NOSC was closed on 1973, as the country was immersed in one of the many to come economic crises. The Mexican space program was relaunched in 2010, with the advent of the Mexican Space Agency. The AEM has as main goals the development of Mexican satellite capabilities in terms of earth observation, navigation, environmental modeling, and surveillance.

[***] This point is designed to provide general explanation on how one can achieve tax savings. Always seek professional advice before engaging in a transaction to be aware of all the risks and costs associated with tax structures.

This background is relevant because outer space was forgotten in Mexican daily life, even in tax laws. ITL does not have provisions specific to space related income. Therefore, to find out whether taxes need to be paid on space activities, we need to start by finding out who pays taxes, and the scope of the law, in the next section.

What are the tax effects?

ITL Article 1, Fractions I, II, and III explain that the individuals subject to income tax are physical persons and legal persons in three cases:

- Mexican residents, on all their income, regardless of the origin of the source of wealth
- Foreign residents with a permanent establishment in the country, on the income related to the permanent establishment
- Foreign residents, relative to income originated from a source of wealth located in the country, when they have no permanent establishment, or when having a permanent establishment, income cannot be attributed to the permanent establishment.

We can conclude that IWS would not be a physical person. On the other hand, ITL Article 7 explains: the term encompasses, "among others, business companies, decentralized entities that primarily perform entrepreneurial activities, banking institutions, associations and partnerships governed by civil law, and partnerships through which entrepreneurial activities are conducted in Mexico". IWS is expected to be a business company, and thus falls in the first part of the definition and qualifies as a legal person for Mexican purposes.

The next question is whether IWS is a Mexican resident or not. Would the fact that the water is extracted from the moon matter? FCC Article 9 Fraction II has the answer: "The following will be deemed as residents in national territory: Legal persons that have established in Mexico the main administration of the business, or the place of effective management".

A new riddle - "effective management ". Well, because we are already on the FCC, let us check the underlying regulations, "Regulations of the Fiscal Federal Code" ("RFFC") *(Reglamento CFF)*. RFCC Article 6 explains: "…a legal person has established in Mexico the main administration of the business, or the place of effective management, when within national territory is the place in which the person(s) that take or execute the decisions of control, direction, operation or management of the legal person and the activities said legal person carries out". Thus, if management decisions are made by physical persons located in Mexico as relevant to IWS, then IWS is a Mexican resident. In my opinion, the definition is very broad – even having a lowly middle manager like yours truly would qualify as executing decisions, as there is no nuance on the degree of autonomy of the entity.

In summary, IWS has to pay taxes on all its income, regardless of the location of the source of wealth, because it is a legal person with Mexican residency.

We can now calculate the tax profit. ITL Article 9, Fraction I explains: "Tax profit shall be determined by subtracting from gross income earned in the fiscal year, the deductions authorized by this Title and the employees' profit-sharing paid in the fiscal year…". As per gross income, ITL Article 16 explains: legal persons "residing in Mexico […]shall include in gross income all income in cash, in kind, in services, in credits, or of any other type, that they earn in the year, including income from their establishments abroad." Even though the source of the wealth is in space, because of the location of IWS's effective management, IWS needs to include on its gross income the revenue from the sales of ice. Thus, gross income is 100 million USD. As per the deductions, Mexican the requirements to allow for the deductions are much more restrictive than the US requirements, and must be "strictly necessary for the purposes of the taxpayer's activity". In top of this requirement, taxpayers need to be able to document their deductions, so that they can offer proof that the deductions meet the many requirements included in Articles 25 through 29, including the 31 non-deductibility exceptions of Article 28 of ITL. For now, let us assume that all 40 million of costs and expenses meet the Mexican requirements.

We have our operating profit: 60. We now have to deal with the profit sharing. In Mexico, businesses are required to distribute a portion of operating profits among all employees, except for the CEO. This added tax, while not income tax per-se is required for our calculation because it reduces taxable income. The base of this profit sharing is usually taxable income plus minus adjustments. For my purposes, and to keep the exposition in focus, I assume those adjustments to be zero and that there are no timing differences. Therefore, the profit shared with employees is USD 6 million. This leaves USD 54 million as taxable profit. The taxes due to the Mexican government are thus 30% * USD 54 million = USD 16.2 million. The after tax profit is USD 43.8 million. Again, assuming these profits stay constant at perpetuity and that they equal cash flow, the share price would be the net present value of the capitalized profits (USD 43.8 million / .5 for the cost of equity) divided by the number of shares (100,000) = USD 876 per share. This new share price is lower than the share price we calculated if IWS were to locate in the United States. Locating IWS in Mexico just made the project less attractive: IWS lost (876 – 948)/948 = approximately 7.60 percent of value is lost.

Legal title

Mexican Constitution Article 42, Fraction IV states that the national territory includes the space above the national territory, with the extensions and modalities as per international law. One would think that space would be included in this fraction as space is regulated by international law in the form of the Outer Space Treaty.

As per the ice that IWS is planning to extract, the MCC Articles 747-749 explain:

- 747: “all things that are not excluded of commerce can be appropriated”,
- 748: “things can excluded of trade because of their nature or by law,
- 749: “things excluded of trade by their nature are those that can’t be possessed by an individual exclusively, and things excluded by law are those things that the law states that can’t be privately owned”.

Hence, in principle, IWS can appropriate the resources on space. While it seems that there is no specific legal provision on the appropriation of space-based resources, the MCC provides an intermediate right: possession.

MCC Articles 790-806 explain that:

- 790: “an individual possesses a thing when it can use a power of fact”;
- 794: “that possession is only for things and rights that can be appropriated”,
- 798: “possession provides to the possessor the presumption of ownership for all legal effects. The possessor in virtue of a personal right or a real right in different from property is not presumed owner, but if it is a possessor in good faith, has on its favor the assumption of having obtained the possession from the owner of the thing or possessed right”.
- 801: “All possessors must be maintained or restituted on the possession against those who have no better right to possess. The best possession is founded on legal title, and lacking this, the longest time in possession.”
- 806: “Possession can be lost through an onerous cession”

In English, possession provides an assumption by the law of ownership, provides protection and means of commercializing possessed items. One can conclude that in principle, space resources are fit for possession, and thus, could be legally sold within the legal Mexican framework even though there is no clear assertion of legal title for space resources. However, the possession right is not as strong as ownership, and thus, adds additional legal risk.

As counter factual, if the sales were not legal in the MCC, then IWS would not be able to meet all the requisites to take deductions for tax purposes. This would put IWS in a situation in which the total income is USD 100 million and its deductions are zero/minimal. The taxable burden then would be 30% of total revenues or 30 million – about twice the size of operating legally.

So, sales of resources appropriated in space seem to be legal within the Mexican framework – but do they meet international treaties?[†††] Turns out that Mexico is an active member of the international community, and has signed and ratified all the space treaties[38], including the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies ("Moon Treaty"). The Moon Treaty was adopted by the General Assembly of the United Nations in 1979. The Moon Treaty entered in force on June 1984 when a fifth country, Austria, ratified the Moon Treaty. As of December 2017, no spacefaring nation has ratified the Moon Treaty.

The Moon Treaty contains several provisions, some of which specifically deny property rights to governments and individuals. Article 11, Paragraph:

- 3: "Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. […]",: "
- 5: "States[…] hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible. […]"
- 7.D: "An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration."

In plain English, countries signing the Moon Treaty renounce to property rights, which are assigned to a newly created supra-national entity, which undertakes benefits and redistributes them somehow, but giving special consideration to the countries doing the work and developing nations.

The Moon Treaty also includes options for change in Article 17, 18 and 20:

- 17: "Amendments might be proposed by any Party…".
- 18: "Ten years after the entry into force […] the question of the review of the Agreement shall be included in the […] agenda of […] the United Nations […] to consider, in the light of past application of the Agreement, whether it requires revision. However, at any time after the Agreement has been in force for five years, the Secretary-General of the United Nations, […], shall, at the request of one third of the States Parties to the Agreement and with the concurrence of the majority of the States Parties, convene a conference of the States Parties to review this Agreement. […]"
- 20: "Any State Party may give notice of its withdrawal […] shall take effect one year from the date of receipt […]".

What all this means is that because the Mexican government ratified the Moon Treaty, Mexico is legally bound to abide by its provisions, and therefore, IWS as Mexican corporation, won't be able to have legal cover under which recover resources in space. Further, if IWS by any chance decides to wait until the Moon Treaty's international regime comes to fruition, IWS would have to then share the profits with an unnamed supra-national agency, which would decide somehow how to deploy the resources. The net effect is a transfer of wealth from the investor of IWS to the user of those resources and to the organization responsible for the redistribution of the resources. IWS can avoid all these issues by locating in Ecuador, for example. One can conclude that Mexico should present notice of withdrawal. Otherwise, it is likely Mexico will not be able to attract investors interested in recovering resources from space, and will lose all the associated tax revenue. Mexico can update its property

[†††] In the hierarchy of Mexican law, treaties have the same level as the Mexican Constitution.

rights to reflect the possibility of recovering resources from the moon, using the US or Luxembourg law's as models. US law is the most comprehensive, but Luxembourg law uses Civil law, just like Mexico's.

Can we lower the tax rate?

Yes – we can. In fact, if Mexican investors want to engage in mining resources in space, investors must locate elsewhere, as Mexico renounced property rights. Using our prior example, we know that the United States and Luxembourg are good candidates because they have property rights for space resources and income tax rates lower than 30%. Similar to the prior example, investors decided to establish IWS in Mexico ("IWS Mexico"), but choose to have the operations executed by a company located in Luxembourg, ("IWS Luxembourg"). Under this scenario, IWS Luxembourg would do the extraction, and sell the water to IWS Mexico. In turn, IWS Mexico would sell the water to its end client. IWS Mexico is responsible for the marketing and sales of the water. Once the client decides to purchase the water, IWS Mexico send a purchase order to IWS Mexico with delivery instructions. Let us assume that IWS Mexico makes an operating profit of 5% on each dollar sold to the customers. IWS Luxembourg makes a profit on the remainder.[39]

We can jump straight into whether IWS Luxembourg would have to pay taxes in Mexico. IWS Luxembourg is located in Luxembourg, and thus is a foreign resident for Mexican purposes. IWS Luxembourg does not have a permanent establishment because all the orders are transmitted from IWS Mexico. Does IWS Luxembourg have source of wealth in Mexico? ITL Article 153, Paragraph 1 explains: foreign residents without permanent establishment are under obligation of paying income tax in Mexico for income in cash, if income is sourced from within Mexico. ITL Articles 154 to 175 explains: the acts or activities that are deemed to have a source of wealth in Mexico include services, use of assets, interest, royalties, prizes, derivative transactions, etc. There is no language of whether buying water would trigger a withholding for IWS Luxembourg, so I conclude it is reasonable to deem the purchase of water as a payment that does not have a source of wealth in Mexico.[40]

We are then ready. IWS Mexico sells the water at 100 million and has a 5% profit, so it makes 5 million of profit. Of these, we remove the employee profit sharing, 10% of the profit, for a taxable income of 4.5 million. The tax burden is 1.35 million.

We know that from IWS Luxembourg, there is no change between selling to IWS US or IWS Mexico. Therefore, income tax burden in Luxembourg is still 18% * USD 55 million.[41] The income taxes paid would then be $9.9 million USD. The total income tax burden is then 11.25 million. Not bad, especially compared with the 16.2 million that IWS Mexico would have have to pay in the first case. The tax savings on income tax is 4.95 million, which under our capitalization assumptions, increase the net present value of IWS by USD 9.9 million for a total of USD 975 million. As you can note, the large tax differential might drive a possible benefit if the company separates operations into lower tax jurisdictions.

CONCLUSIONS

This paper reached the following conclusions:

1. The United States and Mexico do tax revenues from space-based resources because both countries demand their domestic companies to accrue all their income regardless of the source of wealth.
2. Property rights as stated make the sale of space-recovered resources legal for US companies.
3. Tax planning can add significant value. Compared to the US federal income tax rate, the Mexican income tax rate is 9% higher. The extra rate reduces the value of the hypothetical project by approximately 7.60 percent of value. From a pure income tax perspective, the recommendation would be to concentrate as much income in the jurisdiction with the lowest income tax rate. This conclusion is however a partial conclusion. In general, there are three tax levels: federal, state, local. Within each, one can have direct and indirect taxes and one needs to carefully assess the impact of the other tax burdens before reaching a conclusion. Thus, the general lesson is to execute a comprehensive tax model, instead of basing the decision on income tax differentials only.

4. Mexico's legal framework has most of the infrastructure required to provide property rights for resources recovered in space. But, because of the accession to the Moon Treaty, Mexico i) renounced to property rights for space resources, ii) granted these property rights to an unnamed and to be created supra-national entity, and iii) accepted an additional tax on its citizens. This situation creates a disincentive for companies to invest in space mining and locate themselves in Mexico.
5. Mexican companies interested in space mining must locate outside of Mexico. In principle, by using international transactions, Mexican companies can access both: a more favorable legal environment and a lower tax burden.
6. For the Mexican government, the main policy conclusions are two:
    a. Denounce the Moon Treaty using its sunset provisions:
        i. Ten years after the entry into force […] the questions of the review […] to consider, in light of past application […] whether it requires revision.
        ii. Any State Party may give notice of its withdrawal […] shall take effect one year from the date of receipt […].
    b. Update property rights to reflect the possibility of recovering resources from the moon, using the US or Luxembourg law's as models. US law is the most comprehensive, but Luxembourg law uses Civil law, just like Mexico.
7. In the new space age, the spirit of the Moon Treaty and the Outer Space Treaty raises an issue beyond profit: given the current disparities in the world, a portion of the world's population would be privileged to enjoy most of the profits from the endless resources of space. If this situation is left unaddressed, the new space age has potential to deepen socio-economic inequalities to a level never seen before, especially in countries with overage of unskilled labor and weak rule of the law.

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[8] Adam, Chodorow (8 December 2009). "Tax in the Final Frontier: A Theory of Interstellar Tax". *Social Science Research Network*. SSRN 1520413

[9] In December 2017, the United Stated Congress passed the Tax Cuts and Jobs Act, thereby overhauling the United States tax system. The TCJA was the largest overhaul of the United States tax system since 1986. In the legislative process to pass legislation, Congress' lower chamber, the House of Representatives ("the House") initiates a bill, which is then passed on to Congress higher chamber, the Senate. If the Senate changes the language of the measure, it must return to the House for concurrence or additional changes. This back-and-forth negotiation may occur on the House floor, with the House accepting or rejecting Senate amendments or complete Senate text. Often a conference committee will be appointed with both House and Senate members. This group will resolve the differences in committee and report the identical measure back to both bodies for a vote. Conference committees also issue reports outlining the final version of the bill and a detailed explanation of content of the bill. The explanation for the TCJA is called the "Joint Explanatory Statement Of The Committee Of Conference". https://www.finance.senate.gov/imo/media/doc/CRPT-115hrpt466.pdf

[10] 16th Amendment of the US Constitution

[11] Article 73, Fraction VII

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[14] https://www.irs.gov/individuals/international-taxpayers/foreign-tax-credit-how-to-figure-the-credit

[15] Cassidy, Dan. "Federal taxation of international investment and business transactions". 2010. https://clarknuber.com/resource/federa-taxation-international-investment-business-transactions

[16] This matters because if the income is deemed to have been sourced without the United States, then one could claim foreign tax credits. In the case of foreign tax credits, the US Code 901 presupposes that someone would charge you taxes, and thus allows US taxpayers to credit taxes paid abroad against your US tax liability, up to the total US tax liability times (taxable income from sources outside the US / taxable income without US + foreign sources). https://www.irs.gov/individuals/international-taxpayers/foreign-tax-credit-how-to-figure-the-credit

[17] Cambridge Dictionary's Business Definition. 2018. https://dictionary.cambridge.org/dictionary/english/extraction

[18] US Code § 861(a)(5) is not applicable to our case because it refers to inventory purchased abroad and sold within the United States: "Gains, profits, and income derived from the purchase of inventory property (within the meaning of section 865(i)(1)) without the United States (other than within a possession of the United States) and its sale or exchange within the United States." In comparison, we are dealing with inventory recovered, so there is no purchase.

[19] One can note that there is an issue caused by treating space-related activities as if they were foreign activities – one ends up on using the section of the code focused on foreign corporations as language refers to "a foreign corporation engaged shall be taxable…", even though the activities were carried out by a US person. This raises a question for future research – why the IRS included activities for US persons as if they were operating for foreign companies? Plausible hypotheses are i) that by specifying that income from activities in space by US persons is income from sources within the United States, Congress and the IRS avoid the possibility of having US persons claim foreign tax credits on income taxed by foreign governments; ii) that Congress and the IRS were not concerned about taxing domestic companies, as this would be taxed as we saw in Approach 1, rather, they needed to have a way to tax foreign companies that by using US persons could to shift income generated in space to a foreign country; iii) it is just a mistake: perhaps at the moment the language related to space was introduced in US Code § 863 in 1986 and there was no check for consistency; regardless, even if the quirk is a mistake, the tax burden is still due for US persons under Approach A; iv) an as-yet unconsidered reason for the wording. https://www.law.cornell.edu/uscode/text/26/882

[20] Outer Space Treaty Article I

[21] Outer Space Treaty Article II

[22] Outer Space Treaty Article III

[23] Outer Space Treaty Article IV

[24] Outer Space Treaty Article V

[25] Section 51 United States Code § 51303

[26] Section 51 United States Code § 51301(1)

[27] Section 51 United States Code § 51301(2)(A)

[28] Section 51 United States Code § 51301(2)(B)

[29] Section 51 United States Code § 51301(3)

[30] United States v. Sullivan, 274 United States 259 (1927). https://www.law.cornell.edu/supremecourt/text/274/259#fn1

[31] Rutkin v. United States, 343 United States 130 (1952) https://www.law.cornell.edu/supremecourt/text/343/130

[32] James v. United States 366 United States 213 (1961) https://www.law.cornell.edu/supremecourt/text/366/213

[33] Law of 20 July 2017 on the exploration and use of space resources. "Loi du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace." Article I. http://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo

[34] Katz, Plambeck, and Ring, 908-2nd T.M., 2018. United States Income Taxation of Foreign Corporations.

[35] As mentioned above, foreign companies operating in the US directly are taxed on either their business activities or investment income. As per the business activities, if IWS Luxembourg was found to have income effectively connected with the conduct of a trade or business within the United States, then IWS Luxembourg would have to pay taxes on its gross income from sources within the United States. Assuming that IWS Luxembourg profit of USD 55 million is all deemed as effectively connected, IWS Luxembourg would now owe 55 * 21% = USD 11.55 million in the US. Together with taxes already paid in Luxembourg, this would take IWS Luxembourg to a double taxation issue, which, in my experience, would take years to resolve. The risk of taxes on investment in the US is low: while the law requires a withholding on the amount received from sources within the United States by a foreign corporation, this withholding requirement applies on "fixed or determinable annual or periodical ("FDAP") gains, profits, and income", as per 26 United States Code § 881(a). In our case, IWS Luxembourg is selling property to IWS US, and thus, it is specifically excluded from the definition of FDAP. The withholding tax is 30 percent of the value of the payment to the foreign corporation; this rate can be lowered using treaties to avoid double taxation, tools outside of the scope of the paper. https://www.law.cornell.edu/uscode/text/26/881

[36] Luxembourg also charges two more taxes in top of income tax. These are the solidarity surtax, and municipal business tax. Because these taxes are local in nature, they are outside of my scope – that said, their cumulative effect can negate a substantial part of the tax savings. For example, the municipal business tax of the City of Luxembourg is 6.75% of the taxable income. In order to have a fair comparison, all tax levels should be included, which is an area of further research. Moons, 7220 T.M., Business Operations in Luxembourg.

[37] Comisión Nacional del Espacio Exterior. 2018. https://es.wikipedia.org/wiki/Comisi%C3%B3n_Nacional_del_Espacio_Exterior

[38] The space treaties are five: the Outer Space Treaty, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, the Convention on International Liability for Damage Caused by Space Objects, the Convention on Registration of Objects Launched into Outer Space, and the Moon Treaty. http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties.html

[39] Profits might be repatriated using dividends. The analysis of the taxation associated with dividends received by IWS Mexico from IWS Luxembourg is complex, so to keep things in focus, I only focus on the income tax effects. A complete analysis would include these effects. Always discuss with a professional before taking any tax decisions, as this paper not tax advice, rather, only an informative document.

[40] ITL Article 175 seemed to have a catch-all provision. However, the last sentence of the article reads "the provisions in fractions II, III and V also apply to legal persons". I concluded that this sentence forces the whole article to be focused in physical persons (e.g. individuals), and thus, IWS Mexico purchases of ice are not covered by the article.

[41] Again, Luxembourg also charges solidarity surtax, and municipal business tax. Because the solidarity surtax, and municipal business tax are local in nature, they are outside of my scope – that said, their cumulative effect can negate a substantial part of the tax savings. For example, the municipal business tax of the City of Luxembourg is 6.75% of the taxable income. In order to have a fair comparison, all tax levels should be included, which is an area of further research.