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BLOCKCHAIN AND ITS IMPACT ON TRANSFER PRICING CONTROL

MASTER THESIS

Candidate:

VISSIO, Alberto Nicolás

Advisor:

SAMPERNA, Simone

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Table of contents

INTRODUCTION

Cryptocurrencies hit the market in 2009, but they gained more and more ground in recent years. Among all of them, the bitcoin (BTC) was the first cryptocurrency launched, with the objective of becoming a new alternative to traditional payments. Since its introduction, we have been witnesses of its dizzying evolution, at the point of transforming the daily economy and the markets.

None of the above could have been possible without the technology behind it. The heart of bitcoin and other virtual currencies is called blockchain, which can be generalized as "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way" (Iansiti & Lahkani, 2017).

Recognized for its results, this technology has expanded internationally, penetrating more and more industries, constantly redefining regulations, creating new markets and investment opportunities. However, as it is a recent development, whose functionalities grow at an accelerated rate from year to year, there is a lack of knowledge about the scope of its operation and essential technical aspects that could lead to find potential uses.

Blockchain technology promises to be critical in defining how business, finance, registry and government systems will be conducted in the future. Among so many possible applications, this work focuses on the different ways blockchain technology and other similar tools could potentially transform transfer pricing.

I. BLOCKCHAIN

1. FUNDAMENTALS

In order to analyze the potential impact of this technology in taxes, first we need to understand the principal aspects involved. Blockchain can be also defined as "a shared, distributed ledger that facilitates the process of recording transactions and tracking *assets* in a business network" (Gupta, 2017).

Technically, an asset can be tangible (any object, as a car) or intangible (like intellectual property, for example: a patent). So, according to the author, almost anything with value can be tracked and traded on a blockchain network, reducing that way risks and costs.

A useful comparison would be the phenomenon of Internet, which enabled a free, fast and global exchange of information and ideas. In that sense, Fenwick, Kaal and Vermeulen (2018) explain that Blockchain adds another dimension to that idea, by making possible the transference and exchange of those assets (and their values), without the involvement of traditional, both centralized and authoritative, intermediaries (p. 11). This is possible through the store of the information in a decentralized, accessible, and secure online environment.

1.1. CHARACTERISTICS

Gupta (2017) describes the next essential attributes of a Blockchain network (p.7):

- Consensus: For a transaction to be valid, all participants must agree.
- Provenance: Participants know where the asset came from and how its ownership has changed over time.
- Immutability: No participant can tamper with a transaction after it's been recorded to the ledger. If a transaction is wrong, a new transaction must be used to reverse the error, and both transactions are then visible. Less vulnerability.

- Finality: A single, shared ledger provides one place to go to determine the ownership of an asset or the completion of a transaction.

As a result, all transactions are secure, authenticated, and verifiable. In addition, as it was said before, another one important feature is the reduction of intermediaries, which makes the network economical and efficient, thanks to the avoidance of duplication of efforts.

Nevertheless, what makes the blockchain such a revolutionary technology is the fact that the ledger is distributed to a countless number of participants ("nodes") around the world in public peer-to-peer networks (like internet) or private ones (similar to an intranet). Participants hosting a copy of the blockchain can be individuals or organizations (and even things). The fundamental condition, in order to interact with the other participants in the blockchain network is to count with internet connection (Fenwick et al., 2018).

1.2. ADVANTAGES

Moving forward, in business' area, it has the following specific benefits (Gupta, 2017):

- Time savings: Transaction times for complex and multi-party interactions are slashed from days to minutes. Then, the settlement is faster, because it doesn't require verification by a central authority.
- Cost savings: In addition of cutting of intermediaries, a blockchain network reduces expenses because less oversight is needed, as it is self-policed by participants.
- Tighter security: Blockchain's security features protect against tampering, fraud, and cybercrime.

Furthermore, the author explains that some blockchains are permissioned, while others aren't. A permissioned network is critical for a blockchain for business, especially within a regulated industry, because it offers:

- Enhanced privacy: Using IDs and permissions, users can specify which transaction details they want other participants to be allowed to view.
- Improved auditability: Counting with a shared ledger, which serves as a single source of truth, improves the ability to monitor and audit transactions.
- Increased operational efficiency: Pure digitization of assets speeds up the transfer of ownership, so transactions can be conducted at a speed more in line with the pace of businesses.

2. FUNCTIONING

Once some general ideas have been introduced, it is important to understand how a blockchain network works. Murck (2017) summarizes the basic principles underlying the technology as it follows:

a) Distributed database: Each party on a blockchain has access to the entire database and its complete history, while no single party controls the data or the information.
b) Peer-to-peer transmission: Communication occurs directly between peers instead of through a central node. Each node stores and forwards information to all other nodes.
c) Transparency with pseudonymity: Every transaction and its associated value are visible to anyone with access to the system. Each node or user on a blockchain has a unique 30-plus-character alphanumeric address (a “hash”) that identifies it, while transactions occur between them. Users can choose to remain anonymous or provide proof of their identity to others.

d) Irreversibility of Records: Once a transaction is entered in the database and the accounts are updated, the records cannot be altered, because they're linked to every transaction record that came before them (hence the term "chain"). Various computational algorithms and approaches are deployed to ensure that the recording on the database is permanent, chronologically ordered, and available to all others on the network.

e) Computational Logic: The digital nature of the ledger means that blockchain transactions can be tied to computational logic and in essence programmed. So users can set up algorithms and rules that automatically trigger transactions between nodes.

2.1. BLOCKCHAIN'S ECOSYSTEM

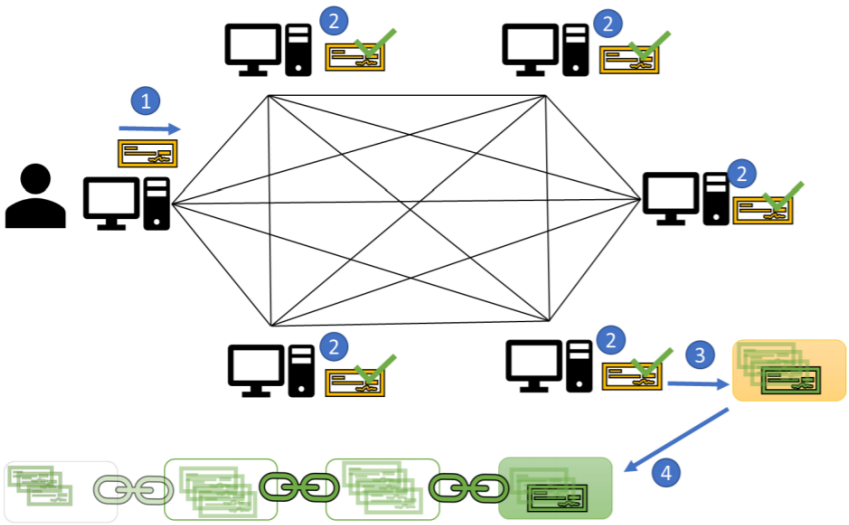
As its name affirms, a blockchain consists in a growing list of linked elements (Axling, 2019). Each element (a block) contains transaction data, the hash of the previous element and a timestamp, which helps to verify the integrity of the entire chain.

In order to provide an example, we can observe on figure n°1 how a participant in the network sends a transaction to the blockchain network. Any participant in the network can independently verify that certain transaction, which is intended to be included in a block, is valid, through the examination of the contents according to the rules of the protocol.

A transaction that is not valid will be rejected by all participants independently, as no central authority is needed. On the other hand, sets of valid transactions are collected into candidate blocks by different participants. A consensus algorithm is used to make one candidate's block the next one in the chain, linked to the preceding block by containing its hash. As a result, this new block is propagated to all nodes in the network.

Figure 1

Simplified blockchain



2.2. PARTICIPANTS

Gupta (2017) categorizes the different roles in the following way:

a) Blockchain user: A participant (typically a business user) with permissions to join the blockchain network and conduct transactions with other network participants.

b) Regulator: A blockchain user with special permissions to oversee the transactions happening within the network. They may be prohibited from conducting transactions.

c) Blockchain developer: Programmers who create the applications and programs, that enable blockchain users to conduct transactions on the network.

d) Blockchain network operator: Individuals who have special permissions and authority to define, create, manage, and monitor the blockchain network. Each business on a blockchain network has a blockchain network operator.

e) Certificate authority: An individual who issues and manages the different types of certificates required to run a permissioned blockchain. For example, certificates may need to be issued to blockchain users or to individual transactions.

The author adds that participants can benefit from:

a) Traditional processing platforms: Existing computer systems that may be used by the blockchain to augment processing. This system may be also needed to initiate requests into the blockchain.
b) Traditional data sources: Existing data systems that may provide data to influence the behavior of the technology and help to define how communications and data transfer will occur between traditional applications/data and the blockchain.

2.3. DISTRIBUTED CONSENSUS

As it has been seen during the explanation of the blockchain functioning, every network has to count with a variable, which will validate the block, in order to adding it to the chain.

Axling (2017) defines a distributed consensus as mechanisms that are used to achieve agreement on a single data value, and thus obtain reliability in a network that can involve unreliable participants. That is because usually they do not only fail to send values, but also send unreliable and conflicting information to different parts of the system. That concept is known as Byzantine Generals' Problem, illustrating how a group of Byzantine generals may have communication problems when trying to agree on their next move.

The dilemma assumes that each general has its own army, situated in different locations around the city they intend to attack. The generals need to agree on either attacking or retreating and it does not matter whether they attack or retreat, as long as all generals reach consensus.

If we apply the dilemma to the context of blockchains, each general represents a network node, and the nodes need to reach consensus on the current state of the system. Putting in another way, the majority of participants within a distributed network have to agree and execute the same action in order to avoid complete failure.

Therefore, the only way to achieve consensus in these types of distributed system is by having at least ⅔ or more reliable and honest network nodes. This means that if most of the network decides to act maliciously, the system is susceptible to failures and attacks.

To solve this issue, the concept of Byzantine fault tolerance (BFT) has been developed, as the property of a system that is able to resist the class of failures derived from the Byzantine Generals' Problem. This means that a BFT system is able to continue operating even if some of the nodes fail or act maliciously.

For example, in Bitcoin's proof-of-work consensus algorithm, the incentive for someone to maintain the security of the blockchain is achieved by a payment: successful mining generates bitcoins. This also makes it more profitable for any partner with sufficient computing resources to maintain the integrity of the chain and generate valid blocks than to double-spend resources. Proof of work is useful on a public blockchain, such as the one used for Bitcoin, but it consumes considerable computing power and electricity, making it an expensive way to reach consensus. Such an expense is unnecessary on a private business network where all participants are known.

A widely used alternative is proof-of-stake. In this scheme, the chance of being picked by the network to create the next block is proportional to some kind of stake in the system, e.g. number of coins owned and sometimes also to the time that the participant has held the coins.

2.4. TYPES:

Axling (2017) divides Blockchain applications into three categories depending on how which participants are allowed to validate (a.k.a. “mine”) blocks.

2.4.1. PUBLIC BLOCKCHAIN

Anyone can join as a validator (a.k.a. "miner") of transactions and contribute to the consensus on the correct chain at any time. The protocol itself assures that consensus is reached on valid data only.

Bitcoin is an example, where anyone in the world can read and interact with. If a transaction is valid, you can expect it to be registered on the blockchain, no matter who is the creator, or validator, of that transaction.

2.4.2. PRIVATE BLOCKCHAIN

A private chain is run and administrated by a single entity, acting as a trusted third party in the chain. Consensus algorithms like proof-of-work are not necessary in this case. It is characterized as a “permissioned” private blockchain: participators are permissioned to interact with the blockchain and are therefore known by the blockchain validator.

2.4.3. CONSORTIUM BLOCKCHAIN

A consortium blockchain has a closed, predefined set of validators that reach consensus on the correct chain. The consensus may be reached using less resource consuming algorithms. As a result, the process of validating transactions speeds up, while it lowers processing power requirements.

3. APPLICATIONS IN INDUSTRIES

3.1. DIFFERENT FIELDS

Weking, Mandalenakis, Hein, Hermes, Böhm and Krcmar (2019) explain that blockchain has the potential to transform multiple industries and to significantly alter the fields of its application. They have identified four domains:

1) Blockchain is strongly affecting financial services, especially the areas of accounting, auditing, and bank transfers. By eliminating a trusted third party, firms can significantly reduce transaction costs. Even blockchain can achieve cross-border transactions in a short amount of time.

2) Supply chain has been defined as the "most promising non-finance application of blockchain". Thanks to the registering way, every member of the system can identify and track the position of a circulating item throughout the chain.

3) Blockchain can be related to the concept of two-sided markets. Transaction parties usually need a trusted third party that facilitates the co-creation of value in the market. These include platform intermediaries, such as Google, Uber, or Amazon, to provide a safe and reliable environment for transactions. However, blockchain eliminates the need for an intermediary by using a crowd of nodes on the system.

4) Some benefits of blockchain in the domain of social welfare has also been addressed. For example, for voting systems, blockchain technology can digitalize the choices, decrease voter tampering, and even improve voter participation.

3.2. IMPACT IN BUSINESS MODELS

The authors explain that, besides cost reduction, traceability, and security improvements, Blockchain offers various opportunities to alter existing business models and create new ones.

For example, it can support the business model and organizational concept of a distributed autonomous organizations (DAO). DAOs exist without central governance, are monitored by shareholders, and are coordinated through smart contracts. In this way, organizations can replace intermediaries enabling them to services at a lower price.

Engaging in a blockchain-based business model enables the use of two modern concepts:

- Cryptography: it ensures authenticity behind all interactions in the network.
- Tokenization: the business model can enhance its value by rewarding stakeholders with tokens or by accepting third-party tokens.

4. SMART CONTRACTS

4.1. MAIN FEAUTURES

Gupta (2017) defines a smart contract as “an agreement or set of rules that govern a business transaction, but stored on the blockchain and executed automatically as part of a transaction”. As to provide an example, in an airline company, a smart contract may define the conditions under which ones a bond transfer occurs if a flight is delayed.

In addition, Szabo (1994) highlights the importance of the technology when characterizing them as “computerized transaction protocol”. The author also explains the three main objectives:

- Satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement)
- Minimize exceptions both malicious and accidental
- Minimize the need for trusted intermediaries.

As seen before, many definitions can be displayed so far but the common elements in all of them are the use of a computer code, displayed on blockchain or similar and automatically executed.

4.2. LIFE-CYCLE STAGES

Taking in consideration smart contracts into a dynamic perspective, Cipollini (2021) summarizes their life cycle as it follows:

1) Coding process: Once the conventional contract is signed, this process begins with the conversion of the clauses into an executable computer program (i.e., the smart contract), thanks the collaboration of software engineers and data scientists.
2) Deployment process: After the creation of the smart contract, the storage of data on the distributed ledger starts. The same data of the previous stage is replicated through the validating nodes in a P2P manner, without the use of a centralized server.
3) Execution: As soon as a certain condition is fulfilled, the smart contract enables the automatic execution of a corresponding action. Accordingly, a series of transactions are automatically executed and validated by the nodes operating on the blockchain network. The execution stage also involves that the validated transaction is finally added to the list of stored transactions.

4) Completion: Once a smart contract is entirely executed, there is an automatic update of the states of all of the involved parties. Accordingly, the transactions during the execution of the smart contract and the updated states are safely stored in the blockchain.

4.3. FOUNDATIONAL TECHNOLOGIES

For every invention that appears, it is fundamental to gain acceptation through the community. Following Iansiti and Lakhani (2017), the adoption of these technologies usually depends on two different factors:

- Novelty: degree to which an application is new to the world
- Complexity: number and diversity of parties that need to work together, to produce value.

Although the ones with both high novelty and complexity take years to evolve, they have the capacity to transform our daily lives. For example: at first, Skype was an unknown or untrusted way of making calls, and nowadays is something totally common.

This is also the case of smart contracts, an application of blockchain which is still in early days. The authors add that, in case of successful advances, it has potential of making deep changes. In business, the impact could be immediate: for example, a payment to a supplier can be performed under a smart contract, as soon as the shipment of goods is delivered.

Of course, its adoption is not easy: it requires major social, legal and political changes. In the last example, the company would need to adapt its systems and internal processes of treasury, even at the point of rethinking the roles of people: the accountant or administrative in charge of the payments may now be forced to move to another function.

As can be seen, transformative applications are still far away in our road. But it makes sense to evaluate their possibilities at the moment and invest in developing technology that can make it happen.

II. TRANSFER PRICING

International taxation is characterized by its complexity itself. Several dimensions are included, each one with different issues involved, but, without any doubt, one of the most important is transfer pricing.

The already difficult-to-understand world of transfer pricing is exposed to constant and disruptive changes, not only in the rules that govern it, but also in the demanding control which it is subject to.

1. FUNDAMENTALS

We cannot discuss about transfer pricing without presenting a general scheme of a Multinational enterprise (MNE), a key player in globalization by developing integrated cross-border business operations. The advances in communication, technology and transportation result into the possibility to place their activities in different parts of the world.

The United Nations (2017) defines them as groups of companies that generally operate worldwide through locally incorporated subsidiaries, permanent establishments or other structures such as joint ventures and partnerships. As many enterprises may participate in the structure of an MNE, operations between them are common. Transactions involving intangibles and services constitute a big proportion of an MNE's commercial transactions and have increased the complexities involved while analyzing them.

In those cases, it becomes fundamental to establish the appropriate price, called the "transfer price", for intra-group and cross-border transfers of goods, intangibles and services.

1.1. DEFINITION:

Then, we can refer transfer pricing as "the setting of prices for transactions between associated enterprises involving the transfer of property or services" (United Nations, 2017).

These transactions are called "controlled" transactions, in opposition to "uncontrolled" transactions between unassociated companies, that can be assumed to operate independently or "on an arm's length basis".

As consequence of the above, a price according to the normal operations of an MNE should be set. On the contrary, when it does not match with internationally applicable norms or with the arm's length principle under domestic law, the tax administration may consider this to be "mis-pricing" and issues of tax avoidance and evasion may potentially arise.

For example, consider the case of a watch manufacturer in "Country A", which distributes its products through a subsidiary in "Country B":

	Country A	Country B
Type	Parent	Subsidiary
Activity	Manufacturer	Distributor
Cost of Act.	1400,00	100,00
Sale price	1500,00	1600,00

We can observe that the distributor itself does not earn a profit: the $1500 transfer price plus the Country B unit's $100 distribution costs are exactly equal to the $1600 retail price. Country B's tax administration considers that the transfer price should be set at $1400 so that Country B's unit shows the group's $100 profit that would be liable for tax.

Nevertheless, arriving at an appropriate transfer price may be not such an easy task, particularly because of the complexity of the activities involved.

1.2. BODY OF RULES

First of all, transfer pricing regimes are creatures of domestic law and each country is required to formulate its own legislation to implement transfer pricing rules (United Nations, 2017). Within that framework, different approaches may be displayed: while some countries

have an explanatory body of rules in the topic, others limit the application of transfer pricing rules to cross-border related party transactions only.

Other source of applicable legislation are tax treaties, which typically only regulates the basic conditions for adjustment of transfer pricing and corresponding adjustments in case of double taxation. Their content advises the application of the arm's length principle but does not deepen into the particulars of transfer pricing rules.

For example, it is generally understood that Article 9 ("Associated enterprises") is not "self-executing" as to domestic application: it does not create a transfer pricing regime in a country where such a regime does not already exist.

Then, a relation between domestic regulation and international rules should be settled. The United Nations (2017) explains that, although transfer pricing being essentially local regulated has a long history, international consistency of transfer pricing rules is positive, not only regarding the basic structure of taxable persons and events but also about the application of the arm's length principle.

However, it is ultimately for each country to adopt an approach that works in its domestic legal and administrative framework, and which is consistent with its treaty obligations.

2. METHODS

As it has been seen so far, everything revolves around the arm's length principle, with the goal of determining a prince of a transaction, which is aligned to it. Then, a conceptual framework for the determination of the arm's length price is needed: a method.

According to the United Nations (2017), no single method is considered suitable in every situation and the taxpayer must select the one that provides the best estimate of an arm's length price for the transaction under analysis.

All these transfer pricing methods rely directly or indirectly on the profit, price or margin information of similar and comparable transactions. This information may be:

- "Internal comparable" based on similar uncontrolled transactions between the entity.
- "External comparable" or third party, involving independent enterprises in the same market or industry.

Feinschreiber (2004) explains that there are six major transfer pricing methods, grouped in two dimensions:

2.1. TRADITIONAL TRANSACTION METHODS

- Comparable Uncontrolled Price (CUP): by comparing a "controlled transaction" with "a comparable uncontrolled transaction."
- Resale Price Method (RPM): to determine profitability of a distributor, by calculating its gross margin.
- Cost Plus (C+ or CP): combines the costs incurred to produce the property with the gross profit markup from the costs.

2.2 TRANSACTION PROFIT METHODS

- Profit comparison methods (CPM or transactional net margin methods –TNMM-): applies objective measures of profitability, called "profit-level indicators," in determining the arm's-length price. The indicators are derived from uncontrolled companies that engage in similar business activities under similar circumstances.

- Profit-split methods: profit (or loss) allocation is determined by reference to the relative value of each participant's contribution to the combined profit (or loss).

2.3. COMMODITIE RULE

The Commodity Rule, also known as the 'sixth method' is especially applicable to commodity transactions. It is in use, with many variations thereof, by several developing countries for arriving at the arm's-length price of import and export transactions of commodities such as grains, oil and oilseeds, oil and gas, mining and fishing.

2.4. PROFIT LEVEL INDICATOR

To compute the arm's length price, Nilesh Patel (2020) explains that, under Resale Price Method (RPM), Cost Plus Method (CP) and Transactional Net Margin Method (TNMM), a Profit Level Indicator (PLI) is used, to compare profitability of either the taxpayer or its associated enterprise (the Tested Party) with that of comparables. The typical ones are:

- With RPM: ratio of 'Gross Profit (GP)/Sales
- With CPM: ratio 'GP/Cost'
- With TNMM: three possible ratios: 'Operating Profit (OP)/Sales' or 'OP/Cost' or 'OP/Assets'.

Among all of them, the particular case of the Berry ratio is presented as an example.

2.4.1. BERRY RATIO

Nilesh Patel (2020) adds that the Berry ratio is calculated as 'Gross Profit (GP)/Operating Cost'. The denominator is also known as Operating Expenses or Value Adding Expenses or SG&A Expenses (Selling, General and Administration Expenses).

The importance of this calculation arises when operating expenses are the only expenses borne by certain enterprise. In such case, the entire functions, assets and risks profile is represented by, and reflecting in, the operating expenses.

As an example, a retailer buys the goods from its factory abroad, and resells them without making any changes over them in other state. The Cost of Goods Sold (COGS) booked in accounts, do not add value because that cost - and related risk - is not really borne by the retailer, but it comes from the factory (Associated Enterprise).

So, Berry Ratio can also be understood as a mark-up based solely on SG&A Expenses, or Operating Expenses, incurred by an enterprise in rendering services to its AE. This method is useful for computing arm's length compensation of limited or low risk distributors or Procurement Entities (with zero inventory levels), or even Service Providers, where the concerned Entity needs to be compensated with reference to Operating Expenses.

The OECD supports that premise, affirming that Berry Ratio can prove useful over intermediary activities, where a taxpayer purchases goods from an Associated Enterprise and on-sells them to other Associated Enterprises.

In those situations, the utilization of other methods can be dangerous: where no funds are blocked in the Inventories, or in Cost of Sales, and the Operating Expenses (or the Value Added Expenses) is all that the Taxpayer has de facto borne, the computation of return on the Value of Goods by applying a PLI based on COGS or Sales will lead to an exorbitant return on the Operating Expenses.

3. OPERATIONS

At this point, it should be clear the focus over the mentioned MNE's internal or controlled operations. Inter-company transactions take place through transfers of tangible and intangible property, the provision of services, as well as inter-company financing, rental and leasing arrangements, or even an exchange of, for example, property for services or the issue of sweat equity (PwC, 2015).

When performing these kinds of operations, transfer pricing rules typically require related entities to compensate each other appropriately, at the point of being commensurate with the value of property transferred or services provided, using the arm's-length principle.

This chapter summarizes different types of inter-company operations and the principles that may be applied, with the goal of determining the proper arm's-length compensation.

3.1. SALES OF TANGIBLE PROPERTY

Tangible property refers to all the physical assets of a business. Main cases usually include:

- Sales of machinery and equipment: if they were provided, for example, from the parent company to manufacturing affiliates, their transfer should receive an arm's-length consideration at the fair market value of those goods.

- Sales of inventory: ideally, arm's-length compensation is determined by direct reference to the prices of 'comparable' products (very similar, if not identical, products sold between unrelated parties under substantially similar economic circumstances)

3.2. TRANSFER OF INTANGIBLE PROPERTY

In general, intangible assets are non-physical in nature, capable of producing future economic benefits, separately identified and possibly protected by a legal right. Examples of

intangible assets include goodwill, patents, brands and trademarks, intellectual property, licenses and publishing rights. They can be classified as it follows:

- Manufacturing intangibles: created by the production activities or the research and development (R&D) effort of the manufacturer. When transferring patents to affiliates, the degree of monopoly powered conveyed is important: the more protection to the owner, the more valuable. About the non-patented know-how, its valuation depends on the industry.

- Marketing intangibles: created by marketing, distribution and after-sales service efforts. For intercompany pricing is important to distinguish product-specific intangibles (like trademarks) from company-specific ones (trade names). The first ones have little or no value when a product is first introduced, while the others include new as well as existing products.

3.3. PROVISION OF SERVICES

In general, for these cases, 'arm's length' is defined as the cost of providing the service, often with the addition of a small margin of profit. In addition, only charges for services that are directly beneficial to the affiliate can be deducted by an affiliate in its tax return. Some typical examples:

- A routine service (as accounting services) where no intangible is transferred: the price charged in arm's-length relationships is invariably based on a cost-plus formula where the 'plus' element varies greatly with the value added of the service and the extent of competition within the market.

- A technical assistance in connection with the transfer of an intangible: as they are usually provided in connection with a license agreement (at no extra charge), only a higher amount is allowed when services in excess of this level are needed. Typically, a per diem amount (itself determined on a cost-plus basis) plus out-of-pocket expenses may be used.

4. GENERAL LEGAL PROCEDURES

When talking about transfer pricing, two sides arise: the taxpayer and tax authorities. In addition, the law provides them with different rights and duties, as they interact with each other.

In that sense, the taxpayer has the obligation of providing the necessary information to the tax authorities, as these last ones reserve the right of start legal procedures.

4.1. DOCUMENTATION

At this point of the paper, we have demonstrated the complexity of the different dimensions that surround the transfer pricing practice. Taking in consideration that situation, a taxpayer should make reasonable efforts to undertake an adequate analysis of his/her operations. That means collecting and producing documentation that fulfill a certain quality standard, but without forgetting about compliance costs imposed on taxpayers. According to the United Nations (2017), this will ensure:

- Taxpayers considering appropriately transfer pricing requirements in establishing prices for transactions between associated enterprises.
- Tax administrations counting with the necessary information to conduct an informed transfer pricing risk assessment and when evaluating a taxpayer's transfer pricing positions upon audit.

The issue of which documentation should be required belongs to the domestic law. However, there is still some divergence of legislation in terms of the nature of documents required, penalties imposed, and the degree of the examiners' authority to collect information when taxpayers fail to produce them.

To put some light over them, there are some international standards than can be followed. The OECD/G20 2015 guidance sets out a standardized three-tiered approach to transfer pricing documentation, suggesting that it should include:

- A master file containing general information about the MNE group, relevant to all MNE group members
- A local file referring specifically to material transactions of the MNE group members resident in the local jurisdiction and setting out the taxpayer's transfer pricing methodology for such material transactions
- A Country-by-Country Report ("CbC Report") containing certain information relating to the global allocation among taxing jurisdictions of the MNE group's income and taxes paid, together with certain general indicators of the location of economic activity within the MNE group.

4.2. DISPUTE RESOLUTIONS

Tax authorities from different countries have started to focus on transfer pricing. Arendsen (2010) explains that, as a result, they are constantly increasing the resources that they can bring to bear on transfer pricing issues, while improving their knowledge in this area.

Because of this increasing focus, taxpayers have been more likely to be the subject of tax audits and other procedures.

4.2.1. AUDIT

Tax audits can be a useful tool for the raising of funds, as the number shows that more and more tax revenues are collected through them. The principal characteristics are the following:

- Circumstances that may result on a tax audit may be external (if for example they are performed on a regular basis) or internal (like a reorganization or restructuring of the taxpayer).

- Some tax authorities may adopt a legalistic approach while others would take a more economic one.

Speaking about the process itself, Arendsen (2010) explains that they may become "very fact-intensive and may include difficult assessments of comparability, judgement of industry, market and financial information, analysis of intangible property ownership and interpretation of intercompany agreements".

After that analysis, tax auditors expose their findings and, as a result, they propose and adjustment (if any) following the audit. In order of settling the audit, these mechanisms could be used:

a) Negotiation: the objective is to reach an agreement between the parties, that could avoid the uncertainty of a further procedure.

b) Litigation: the chances of success in court will depend on the defense of the taxpayer. Nevertheless, the cost should be considered: Expert witnesses, forensic costs, document production and depositions and interviews lead to significant costs.

c) Arbitration: usually under the form of a Mutual Agreement Procedure (MAP, for the OECD) is usually used in cases to resolve disputes on withholding tax issues, the attribution of profits to a permanent establishment, transfer pricing or dual residency. Failure to resolve a case usually leads to double taxation, which can be a major impediment to cross-border activity. Within the European Union, the EU Arbitration Convention provides for arbitration of unresolved transfer pricing cases between EU countries. However, the OECD arrangement is not restricted to transfer pricing issues and so is broader in scope.

4.2.2. ADVANCE PRICING AGREEMENTS

Deloitte (2015) defines an Advance Pricing Agreement (APA) as "a procedural agreement between one or more taxpayers and one or more tax authorities that aims to avoid any transfer pricing disputes, by determining in advance a set of criteria to apply, within a

specified period of time, for specific cross-border controlled transactions, to ensure their consistence with the market principle".

Its procedure starts on request of every taxpayer performing cross-border controlled transactions, which looks for a reduction of risks of revaluations by transfer pricing audits, by determining in advance the methodology that will be applied to assess the tax base.

While other aspects of the process vary according the legislation of every country (period of years, obligations for the taxpayer, etc.), in general three types of APAs exist:

a) Unilateral APA: between a taxpayer and the tax authorities of a certain country.

b) Bilateral APA: a taxpayer requests that the local fiscal authorities enter into an agreement with a foreign tax administration, under the 'mutual agreement' provisions of the respective Double Tax Treaty.

c) Multilateral APA: an alternative to the last point, with two or more foreign tax administrations included.

Participating in an APA does not imply that the taxpayer is not subject anymore to audits: tax authorities may control, as part of their regular procedures. As a result of them, the authorities may revise the APA or even cancel it, depending on the level of failure of the taxpayer to comply with it.

III. FUTURE OF TRANSFER PRICING CONTROL

In terms of transformation and automation, there is plenty of room to adapt some internal procedures to the new technologies, as blockchain, with the aim of efficiency.

In this chapter, a model of transfer pricing based on that technology is discussed. The ultimate goal is the development of an automated system for transfer pricing control.

1. CODING APA INTO A SMART CONTRACT

The first step of this procedure intends to connect two concepts that were discussed on last chapters, APAs and smart contracts, with the goal of delineate a proper methodology to convert the essential elements of the first one into computer language.

To reach that difficult task, an interdisciplinary team is needed, from tax scholars (with knowledge about transfer pricing) to software engineers (experts on Blockchain or any artificial intelligence system related).

1.1. TECHNICAL AND LEGAL CHALLENGES:

Before getting deepen into the entire process, it is necessary to clarify the obstacles that may arise. In that sense, Cipollini (2021) summarizes the principal ones as it follows:

a) Absence of a widely accepted computer language: it should be comprehensive and easy, at the point of becoming understandable for non-technical people.

b) Lack of common understanding about aspects of the contract to be included: a distinction between operational parts of a contract (clauses that describe procedures and actions; thus, automatable), in opposition to non-operational ones (called “legal prose” and non-immediately automatable, because they are ambiguous or require interpretation).

The challenge is how to manage the coding process of the last ones. One alternative lies over the effort of lawyers, who should avoid as much as possible the use of vague contractual terms and replace them with more quantitative elements (rather than qualitative ones).

The other option involves the use of artificial intelligence nurtured of treaties, law and regulations, as a filter to select the correct interpretation of the legal prose. In this case, it becomes manageable and executable by using additional tools that substitute human intervention.

c) Immutability of the Blockchain: what started as an advantage for this technology, may become a limitation for transfer pricing purposes. Regarding the coding process, the developers should be capable of foreseeing any future scenario at the programming stage, including the possibility of modifications of the code, in case of a change of mind of the parties.

1.2. SMART APA: UNIFYING MODEL

After some research of the literature, Cipollini (2021) details a model that could be able to face such technical and legal challenges, while providing a standardized and uniformed methodology for the coding process.

The model at issue is based on the work of Ladleif and Weske (2019), which propose a unifying model of smart contracts that may match successfully with the essential structure of an APA, with the following five components:

1) Roles: number and types of the parties in a given contract, as well as their different rights and permissions.

2) Data sources: includes three subcomponents:

- Parameters: quantitative values negotiated in every contract.
- Variables: custom run-time state values, not negotiated beforehand.

- Oracles: agents who find information in the real world (e.g., by checking data from websites).

3) Actions: any activity that may occur during the execution of a contract. They are either performed by one or more roles or considered autonomous. Once performed, they lead to an updated legal state, with the consequences of the action applied.

4) Conditions: their function is to interplay between actions and legal states, with three classifications:

- Temporal conditions
- Evaluative conditions
- Objective conditions

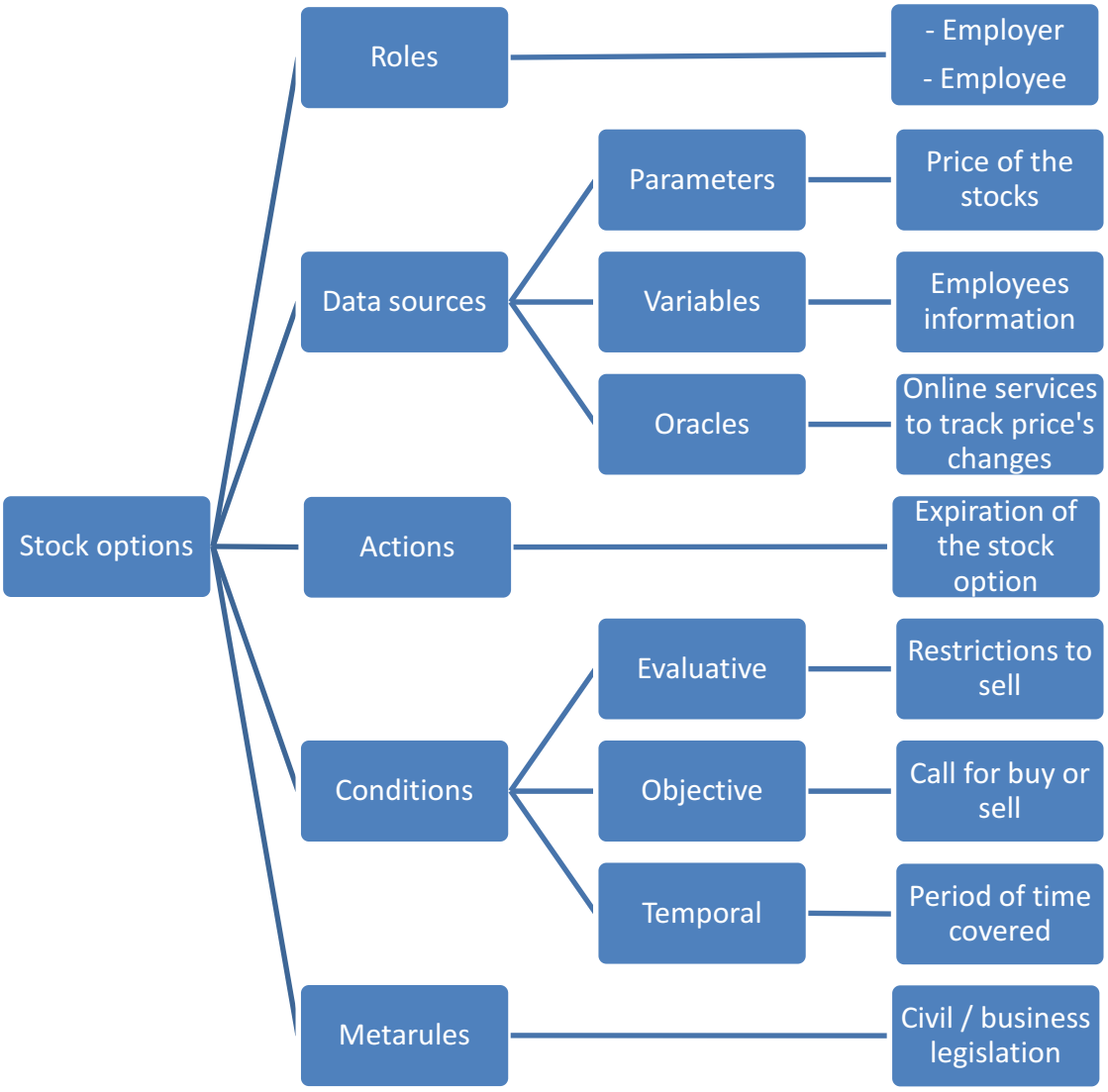
5) Metarules: legislation or regulations that eventually governs the performance of the contract and the interpretation of the legal relationships.

These premises may be applicable to different types of smart contracts. As an example, a stock options contract (to concede the buyer the right to buy or sell stocks at a predetermined price and within a specified time) may be transformed into a smart contract.

With the blockchain technology, tokens can be added: they would represent shares of a traditional company, and that allow to facilitate their trading. Walker (2019) explains that the goal would be for "private companies to restrict stock and option transfers to specific whitelists of approved parties (e.g. accredited investors only) at a designated time (e.g. after a vesting period or holding period), ensuring that all transactions and token holders are approved by the issuer and, if required by law, a transfer agent. Then, the characteristics would be:

Figure 2

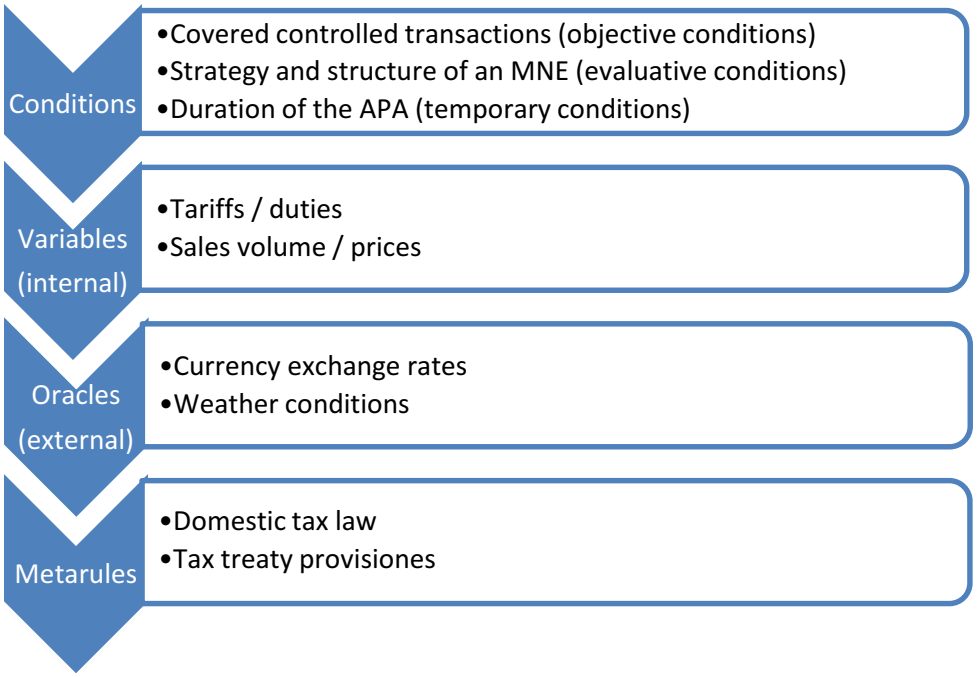
Stock options as Smart contracts



At this point, the question should be how to relate those concepts belonging to a general model to a specific one, which involves smart contracts specially addressed to APAs' coding (i.e., a smart APA model). The basic principle is the possibility of identifying proper matches between conventional and computer language, according to an analytic review of the basic structure of an APA. The most important characteristics would be:

Figure 3

Advanced price agreements as smart contracts



2. SMART SYSTEM FOR TP CONTROL

In the last chapter the possibility of coding APAs into smart contract, by converting conventional clauses into computer language components, was state. However, is necessary to explore how those APAs (now coded into smart contracts) can concretely support and simplify compliance for MNEs, while control for tax authorities.

What would turn into “smart” this system? The use of smart contracts and blockchain technology, interacting each other. Cipollini (2021) explains that at the same time the execution of smart contracts is based on the availability of data sources, the start-up of a smart APAs would rely on the existence of a large and sufficient amount of data stored, for example, in a blockchain.

2.1. STORING DATA IN BLOCKCHAIN

The question at this point may be why we should need blockchain, considering that we have already configured our smart APA. When one of its parameters is settled as a quantitative value, subject to changes over time (e.g., sales volume), it is necessary to count with related data properly stored using that technology.

It follows from the above that every MNE should analyze its data about the supply chain, in order to digitalize the related information that can be useful for transfer pricing purposes. Consequently, it should be stored on the distribution ledger to make it available in real time.

In order to maximize the automation, another possibility is to digitalize also the intra-group transactions, to validate them under the parameters of the APA.

Finally, besides data from the supply chain and intra-group transactions, smart APAs execution could benefit from storing a large number of other sources of information on the blockchain, as economic or market conditions.

In conclusion, the feasibility of a smart TP control system is strictly dependent on the availability of such data promptly stored on the blockchain.

2.2. PROCESSING DATA IN BLOCKCHAIN

Once the information is stored, the process is not finished. At this stage, appropriate analysis techniques to select only the information that is useful are required. To achieve this objective, Denham (2017) replicates the definition about the two tools can be used:

A. Artificial intelligence: the analysis of data to model some aspect of the world. Inferences from these models are then used to predict and anticipate possible future events.
B. Data analytics: the examination of high-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making.

On these premises, the combined use of both of them is referred as “data science”.

3. EXECUTING AN SMART CONTRACT

Once the proper technology environment is established and all of the necessary tools are implemented, the automatic executions of smart APA is possible, within a new automatic system for TP control.

In this context, two main objectives arise: transfer price calculation and transaction validation.

3.1. TRANSFER PRICE CALCULATION

The parameters of the smart APA (that represent the agreed TP methodology and the other criteria for the determination of the arm’s length price) will operate using artificial intelligence and data analytics, with the goal of analyzing the data stored on the blockchain.

This way, the TP methodology will be implemented under the rules agreed within the APA. The execution process will elaborate on these parameters considering data resulting from

the other computer language components of the APA smart contract, including conditions, variables, oracles, and metarules as seen before.

The outcome at this stage will be then a range of prices in compliance with the terms of an APA. As the entire process occurs automatically through the execution of the smart APA on the blockchain, Cipollini (2021) adds that TP departments of MNEs and tax administrations will benefit from an enormous reduction of their workload; the respective duties usually involving TP documentation, reporting, and monitoring will, in fact, be entirely replaced by the software code of the smart APA that is stored, deployed, and executed on the blockchain.

3.2. TRANSACTION VALIDATION

Now the MNE plays as a validating node in the blockchain network, to confirm a transaction at a given price withing the range of prices from previous stage.

At this stage, since the transaction has already been positively verified under the terms of the APA, tax administrations will automatically validate that transaction with no exceptions. Consequently, a new block of data – representing that transaction – will be added to the blockchain in an immutable and safe manner.

Therefore, the outcome of this system of TP control is based on a mechanism when there is a 'green light' for validating the transaction any time the transfer price of that intra-group transaction is within the range of prices automatically calculated by the smart APA.

3.3. REAL – TIME MONITORING

In the previous model, it can be observed that the stages of transfer price calculation and transaction validation now become a fully automated process. Then, for tax administrators there is no longer a need for dedicated monitoring activities for the execution of an APA.

So, this process do not involve any human intervention from the tax administration side, since the execution of the code already ensures results in compliance with the terms of the APA. This way, the introduction of a smart TP control system can minimize interactions between tax administrations and MNEs, cutting down administration costs with no more need for annual audits for APA monitoring.

Furthermore, the new system can provide a valuable contribution to improve transparency and certainty in TP control as well as minimize litigation due to the absence of human errors or different interpretations for factual elements or legal clauses.

Benefits about cost-savings can be extended to the MNEs, which thanks to the fact that the relevant information is already stored on the blockchain and made available in real-time for tax authorities, there will no longer be a need to submit annual reports for APA monitoring.

IV. IMPACT ON TRANSFER PRICING POLICY

The model of the last chapter has a potential to become a solution for the current issues, in matters of transfer pricing. Next, its alignment with the challenges identified by certain international organisms is discussed.

1. OECD'S BEPS

Addressing base erosion and profit shifting has become a priority for governments around the world. In 2013, OECD and G20 countries worked together to adopt an action plan, known as BEPS and published in 2015 (as a 1.0 version).

Since 2018, OECD and Inclusive Framework have extended the project with two reports (Pillar 1 and 2) and a 2.0 BEPS version is expected to be finished by 2022.

Their principal premises are analyzed in the following paragraphs.

1.1. BEPS 1.0

The BEPS 1.0 includes 15 final actions to contrast the issues related with base erosion and profit shifting, with the goal of ensuring that profits are taxed where economic activities generating the profits are performed and where value is created.

In this context, a transfer pricing system, based on blockchain technology and smart contracts, could offer some solutions within the scope of two of the listed actions.

1.1.1. ACTIONS 8-10

Actions 8, 9, and 10 are grouped together by the OECD, as they provide guidance on several key transfer pricing areas. However, they can be identified individually:

- Action 8: covers transfer pricing issues relating to transactions involving intangibles, as well as cost contribution arrangements (CCAs).

- Action 9: addresses the contractual allocation of risks and the resulting allocation of profits to them, which may not correspond with the activities actually carried out.
- Action 10: focuses on other high-risk areas, such as the recharacterization of transactions, the use of transfer pricing methods in certain abusive situations, and management fees, among other things.

Cipollini (2021) explains that, in order to reach those objectives, a functional analysis is fundamental to "provide an overview of the value creation process within the supply chain, taking into account the contributions of the related parties within a controlled intra-group transaction".

About that goal, the logic implies that a better result can be reached if more information is considered. Then, a smart system for transfer pricing control could enable the taxpayer to process a large amount of data, even in a brief amount of time, allowing a more effective implementation of Actions 8-10 thanks more details about the value creation process.

For example, the author affirms that in the case of a transaction involving intangibles, the smart contract can find the information on the distributed ledger to check when and where a specific file has been downloaded or uploaded; to identify the place and the time when the value creation occurs, enabling a more precise allocation of intangibles under the terms of an APA.

In addition, as the model already contemplates the critical assumptions of an APA such as economic or market conditions, the organizational structure of a particular MNE, or the nature of the functions and risks of the different enterprises involved in the transactions, a better accomplishment of the goals of those actions is expected.

1.1.2. ACTION 13

Action 13 is focused on the development of rules on TP documentation, with the aim of ensuring transparency from MNEs with respect to the global allocation of income, economic activities, and taxes paid among different countries.

As seen in point 4.1 of Chapter II, multinational enterprises are required to adopt a three-tiered standardized approach to TP documentation, in order to fulfill these goals set by the OECD (2015):

1. To ensure that taxpayers give appropriate consideration to transfer pricing requirements in establishing prices and other conditions for transactions between associated enterprises and in reporting the income derived from such transactions in their tax returns;
2. To provide tax administrations with the information necessary to conduct an informed transfer pricing risk assessment; and
3. To provide tax administrations with useful information to employ in conducting an appropriately thorough audit of the transfer pricing practices of entities subject to tax in their jurisdiction, although it may be necessary to supplement the documentation with additional information as the audit progresses.

Nevertheless, it is stated that "each of these objectives should be considered in designing appropriate domestic transfer pricing documentation requirements". So, it seems there is space to consider the opportunities of blockchain technology and smart contracts for transfer pricing documentation.

In relation with that theory, Cipollini (2021) declares that, in the future, the financial reports of the entities of a multination group could become a distributed ledger auditable on a real-time basis. In line with the stated three-tiered approach, a great part of the information of

the master file, the local file, and the CbC report could also be registered on that distributed ledger.

The main advantage is the incredibly high amount of updated and verified information, which can be immediately available for tax audits within a network, where all of the participants share the same version of the distributed ledger. As long as relevant data is available in real-time there, an enormous saving of time and costs for MNEs and tax administrations would result about the tasks related to reporting and monitoring.

1.2. BEPS 2.0

The impact of blockchain and smart contracts in the area of transfer pricing should also be considered with respect to the last initiatives of the members of the Inclusive Framework, related to the tax challenges of the digital economy.

On this matter, the work under Pillar One recognizes that "the existing international tax rules generally attach a taxing right to profits deriving from a physical presence in a jurisdiction" (OECD, 2020). However, given the globalization and the digitalization of the economy, the allocation of taxing rights and taxable profits can no longer be exclusively circumscribed by reference to physical presence.

Then, the proposal implies that some tax rights on MNEs will be reassigned, from their countries of origin to the markets in which these companies carry out their economic activity and obtain profits, regardless of whether or not they have a physical presence in them.

According to the Report, existing TP documentation could be used for this purpose considering that the master file and local file already include information on the functions performed, assets used, and risk assumed by the entities in an MNE group.

Based on these facts, Cipollini (2021) thinks that the implementation of a smart system for transfer pricing control could lead to tremendous improvement in the performance of the qualitative activities test.

2. EUROPEAN COMMISSION ASSESMENT

Moving forward from the OECD framework, the author recognizes that, "in a number of recent cases, the European Commission assumed that certain rulings issued in favor of MNEs by the respective tax authorities constitute illegal state aid" (2021). The organism believes that, when tax authorities agree on transactions that are not in line with the arm's length principle by way of rulings, they might grant a selective advantage to the beneficiary.

The author provides an example: in the Amazon case, the Commission assumes that the application of the residual profit split method determines the attribution of all intangible-related returns to one entity (Amazon Europe Technologies Holding SCS) while, according to the functional analysis, the party performing valuable functions in the intra-group licence transaction is another entity of the same MNE group (Amazon EU Sarl).

Therefore, as no direct comparables for the licence agreement exist, the Commission concludes that the transactional net margin method – rather than the residual profit split method – is the most appropriate method for determining the arm's length remuneration.

On these bases, blockchain technology and smart contracts would allow to find objective conclusions, based on the performance of a code on the distributed ledger and the availability of a large amount of real-time information from the supply chain and, that way, avoid state aid disputes on APAs.

V. EATON CASE:

Of course, this entire theoretical explanation wouldn't have value if a practical application is not introduced. In this chapter, it is showed how the artificial technology and blockchain would be used to solve transfer pricing issues, considering a real case.

1. FINDING OF FACTS:

As seen through this project, the knowledge about this kinds of technology could be applicable to turn a traditional APA into a smart one. With those notions, Eaton case is analyzed.

1.1. THE COMPANY:

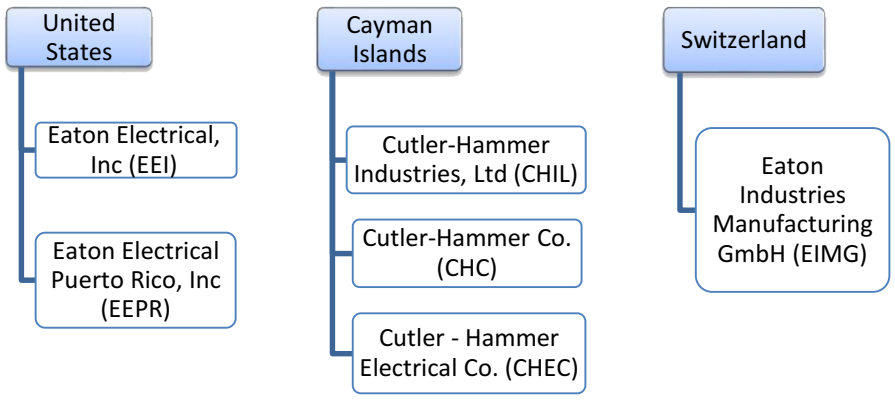
Before exploring the principal aspects of the APA procedures involving Eaton and the Internal Revenue Service (IRS), let´s start with some basic information about the company.

1.1.1. OVERVIEW

The T.C. Memo. 2017-147 of the United States Tax Court describes Eaton as a global manufacturer of electrical and industrial products, based in Ohio. During the years at issue, it was the publicly held parent company of this group, with companies based in three countries:

Figure 4

Eaton's structure



During the analyzed period, that Memo explained that Eaton developed, manufactured, and sold circuit breaker products through various manufacturing plants in Puerto Rico and the Dominican Republic. The term "Island plants" is used to group them, which were operated through EEPR, CHC, CHEC, and CHIL.

The company sold the same breaker products to two parts of EEI in the United States:

- ✓ EEI's assembly plants (U.S. assembly), which inserted the breaker products into the electrical panelboards and switchgear.
- ✓ EEI's distribution department (U.S. distribution), which was responsible for selling breaker products to third parties (original equipment manufacturers -OEMs-, distributors, or other large direct customers).

In addition, Eaton owned and operated a number of facilities that manufactured and/or assembled products that incorporated Island plants manufactured products and other products. These ones were in Asheville, North Carolina, Lincoln, Illinois, Cleveland, Tennessee, Fayetteville, North Carolina, Greenwood, South Carolina, and Sumter, South Carolina.

First of them, Lincoln plant, produced a complete residential breaker product until 2006. Starting in April of that year, industrial breaker products were manufactured only in the Island plants.

1.1.2. TAX & FINANCIAL REPORTING

Both the consolidated Federal income tax returns and financial statements were prepared for the company on a calendar year basis, in accordance with U.S. Generally Accepted Accounting Principles (GAAP).

Speaking about the information flow, Eaton used principally the following systems:

- ✓ VISTA System: defined as a legacy electronic order management system, where third parties and Eaton's salespersons or its internal purchasers could place orders in. It contained information relating to an invoice transaction, with data such the customer data, uhnit sale price, etc. Reports generated from this system were used for transfer pricing calculations.
- ✓ Mirror ledgers: EEI maintained a group of ledgers that recorded:
  - The arm's-length transfer price for the breaker products, as an expense. These ones, or COGS, reduced the net income of EEI.
  - Revenue from sales of breaker products: (1) to third parties, including OEMs and distributors, at arm's-length prices, and (2) to internal assembly plants at an internal management price (approximately 1.3 times the cost of manufacturing). On the contrary, the transfer price computed was around 1,8 times that cost from manufacturing.

1.1. THE APA PROGRAM:

The T.C. Memo. 2017-147 of the United States Tax Court defines that program as a dispute resolution process, designed to resolve actual or potential future transfer pricing disputes between the IRS and a taxpayer.

1.2.1. GENERAL AGREEMENTS:

After a series of negotiations, Eaton reached an agreement with the US fiscal authorities on the terms of petitioner's first APA (APA I), which covered 2001-05 tax years. Although it also covered the license of intangible property and cost sharing agreement between the companies of the same group, the focus was over the breaker product transfers: EEI U.S. distribution purchased breaker products from the Island plants and either:

- resold those products to unrelated U.S. and foreign parties; or

- transferred the breaker products to affiliated U.S. assembly plants and foreign subsidiaries.

It should be noted that, during 2005 and 2006, EEI U.S. distribution purchased 100% of the Island plants' manufactured breaker products.

1.2.2. TANGIBLE PROPERTY TRANSFER:

APA I defined a breaker product transfer as "EEI's purchase of breaker products from EEPR for distribution to affiliated U.S. assembly plants, third-party U.S. OEM customers, and other related and third-party customers". The transfer pricing methodology (TPM) was constructed as a two-step method:

1) EEI would apply the CUP method to determine its constructed intercompany revenue, as the sum of the following three amounts:

a) For Breaker Products with an Exact Catalog Number Match: the average per unit OEM Sales Price for such a product multiplied by the number of units transferred by CHI to Affiliated U.S. Assembly Plants.

b) For Breaker Products without an Exact Catalog Number Match, but within a given Product Category: the average OEM Sales Price Markup for the Product Category multiplied by CH-Puerto Rico's manufacturing costs of such products within the Product Category transferred by CHI to Affiliated U.S. Assembly Plants.

c) For any other products: the average OEM Sales Price Markup for all Product Categories multiplied by CH-Puerto Rico's manufacturing costs of such products transferred by CHI to Affiliated U.S. Assembly Plants.

The resulted constructed income revenue will join the following items into a "constructed income statement":

- U.S. third-party sales revenue
- International sales revenue
- Cost of sales: transfer prices paid by EEI to EEPR
- Breaker product operating expenses.

2) EEI would apply the CPM method to test that constructed income statement, using a Berry ratio as the profit level indicator (PLI), which was determined using independent distributors. For the TPM purposes, calculations should arrive at:

- a Berry ratio between 1.20 and 1.27
- a ratio of SG&A expenses to EEI's sales revenue for breaker products to meet or exceed 13%.

For each APA year, if EEI's yearend Berry ratio was not in compliance with the TPM, APA I required to make an adjustment to the purchase price of the breaker products acquired from the Island plants that would bring EEI's Berry ratio within the established range.

1.2. DISPUTES AT TAX COURT:

The IRS challenged the transfer pricing methodologies used in the advance pricing agreement for the analysis of the arm's length standard of Eaton's intercompany transactions. The IRS also argued that Eaton committed material mistakes during the filing procedures and did not comply in good faith with the terms and conditions of the agreements.

Despite Eaton's corrections of the errors and amendments to its advance pricing agreement annual reports and federal income tax returns, the IRS did not accept the amended returns. Then, in the year 2011, the IRS canceled the agreements stating they presented material deficiencies in the revenue procedures. The IRS determined a significant transfer pricing adjustment plus penalties.

After years of discussion, the US Tax Court concluded that the IRS Commissioner committed an abuse of discretion when canceling the advance pricing agreements Eaton had in place. Not only it was ruled in favor of Eaton about that situation, but also about it was not subject to penalties or liabilities.

2. PROPOSED METHODOLOGY:

In this section, the objective is to analyze the different issues observed when Eaton applied for the APA programs. From the findings, a methodology is proposed, using the technology of Blockchain and artificial intelligence, with the goal of improving the results.

2.1. DISCOVERED MAIN ISSUES:

Through the implementation of the APAs, Eaton experimented some situations that showed a difficulty in the compliance with the terms of an agreement.

2.1.1. REGISTRATION SYSTEMS:

In order to gather the necessary data for transfer pricing purposes, Eaton used two main sources of information: VISTA system and its mirror ledgers. About these last ones, the T.C. Memo. 2017-147 of the United States Tax Court explained that for 2005 and 2006, EEI maintained six mirror ledgers related to the Island plants' operations.

This situation can be traduced as a large flow of information that should be manage with a lot of care, to avoid mistakes. For example, to add the manufacturing costs to the calculations, Eaton started from the standards costs (the expected ones) and multiplied them for a factor called PVFF (plant variance and freight factor):

$$PVFF = \frac{\text{Each plant's actual cost}}{\text{Each plant's standard cost}}$$

Then, as the VISTA system did not record actual manufacturing, Eaton needed to adjust the standard cost (which did were registered) by variances. Nevertheless, for the calculation the tax manager in charge used the VISTA standard costs, assuming they were the same as the ones from the Island plant's ledgers.

As a result, multiplying the VISTA standard costs by the PVFF resulted in an incorrect manufacturing cost, because the standard costs in the Island plants' ledgers used to determine the PVFF were not the same as the VISTA standard costs. This error led to a higher price transfer price being reported on the tax returns, which led to an adjustment from the IRS.

These kinds of problems may be avoided using the appropriate data analytics which capture only the necessary information that, in addition, wouldn't be duplicated or in contrast with other data.

2.1.2. CALCULATION TIME:

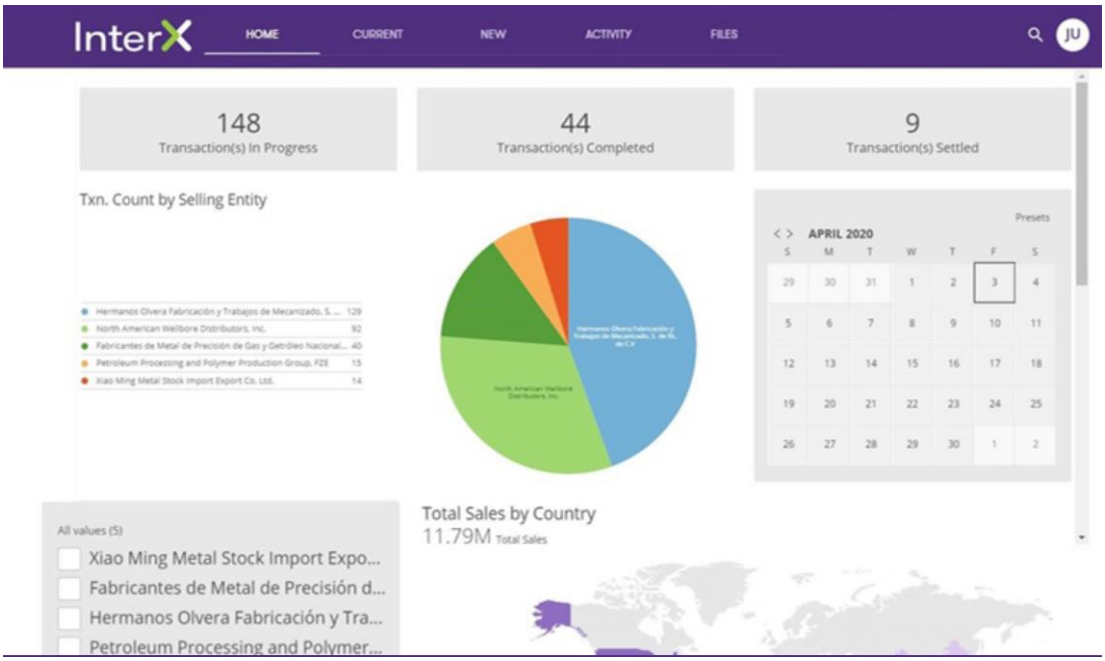
Working this way, the calculations were done at the end of every fiscal year, once the entire information was available. Although that situation only secures the certainty of the numbers, it is also important to keep tracking about the different transactions.

This is especially fundamental in the framework of an APA agreement like in this case, because, as it was explained before, Eaton needed to comply with certain parameters when applying the CPM method: a range of Berry ratio and the ratio of SG&A expenses to sales revenue).

In relation with this issue, a system that uses blockchain technology to provide transfer pricing analytics and transparency for intercompany transactions could be very useful. Examples of that model is "Inter.x", a software designed and provided by Grant Thornton.

Figure 5

"Inter.x" platform



It is stated in its web page that a system like this "streamlines out-of-sync, decentralized processes into an efficient and reliable system, providing the visibility and transparency needed to analyze your intercompany transactions around the globe".

With a platform in that line, different conclusions can be extracted from the metrics and the data, that could allow to make changes during the fiscal year, not waiting until the end of it.

2.1.3. INFORMATION TIME:

As we have seen so far, not only the taxpayer can be benefit from this time-to-time information. Tax authorities can count with the data instantly, because they could be shared automatically in the blockchain, to analyze it in advance and ask for further explanations, if needed.

In our case, Eaton suffered the adjustments because, in part, the numbers were already in its tax filings. If the control from the tax authorities is done at the same time, the probability of changes gets lower, as some doubts and criteria could be agreed in advance.

2.1.4. OEM CATEGORIZATION:

The Memo also explains that Eaton's tax and information technology departments categorize customers in the following way:

- Code "00": to designate "direct customers", including OEMs as well as other customers that purchased products from Eaton directly (rather than through a third-party distributor).
- Subcode "99": captured all OEM transactions.

However, it was discovered that, although subcode 99 was labeled as "OEM", it identified customers who purchased breaker products from more than one of petitioner's salespeople and that sales to OEMs would also be captured by other subcodes.

To correct this misclassification in its amended APA annual reports, a complete list of OEMs was compiled. Although this kind of mistake could have had serious implication, then it was proved that it resulted only in a 0.69% and 0.82% understatement of the transfer price for tax years 2005 and 2006, respectively (no tax advantage at all).

2.1.5. PURCHASE RESALE ERROR:

EEI purchases and resells products other than Island plants' manufactured products. These products are not subject to the APAs because they are not Island plants-produced breaker products. Because of that, prices, revenue, and SG&A expenses related to these products should be excluded from the TPM analysis by excluding their associated "billing line" field from the IRS report.

Although the personal believed that that exclusion was correctly done, it was discovered that it was not. It was solved by re-running the IRS reports and excluding the correct purchase resale billing lines. Similar to the previous point, it was concluded that the quantitative effect of this error was a 1.29% and a 2.02% overstatement of the transfer price for tax years 2005 and 2006, respectively.

2.1.6. INTERNATIONAL SALES ERROR:

EEI excluded few international sales from the revenue reported on the constructed income statement, which resulted in the transfer price's being understated.

It was amended by using VISTA data to capture international sales. Again, it was showed that the effect of this error was a 0.97% and 0.62% understatement of the transfer price for tax years 2005 and 2006, respectively, eliminating a tax advantage.

2.1.7. LINCOLN SALES ERROR:

The Lincoln plant sold an industrial breaker product line, which included both Island plants manufactured breaker products and Lincoln plant manufactured breaker products.

In 2005, Eaton did not include revenue from the industrial breaker products line in the constructed income statement for that year, because it could not segregate reliably both of them. But from 2006, breaker products in the industrial breaker product line were manufactured only in the Island plants and, therefore, it was possible to identify the APA-covered sales of these products through the Lincoln plant since that year.

However, these sales were not included in the APA computations because the tax department was not aware of the change. The error was corrected, and it was concluded that its effect was a 0.19% overstatement of the transfer price for 2006.

2.2. ALTERNATIVE METHOD:

Once the current situation has been analyzed, the theoretical schemes seen so far can be applied to this real case.

In this chapter, an example of the procedure that may be applicable is shown. The hypothesis at this point is that, if we are able to design a method using the simulation of not-so-complex tools, it could work even better with well-prepared platforms.

Then, as the main idea is to develop an APA smart contract with the premises seen so far, the four-steps life cycle is adapted.

2.2.1. CODING:

As we have seen before, the first step relies into the possibility of transforming the different rules of the agreed APA into a digital platform.

The main challenge at this point is to design a program that, only through the input of the information, could be able of process it in order to get the calculations. In addition, the objective is to reduce at the minimum the participation of humans, once the codification is done.

To achieve that goal, an interpretative lecture of the terms of the APA is fundamental, to separate correctly the operational parts from the non-operational ones. That way, the automatable clauses are identified, while they become the basis of the entire structure.

In our case and considering the above, the focus will be over the constructed income statement. Five items constitute that concept, with special complexity over the constructed income revenue, which should be calculated from different sources of information.

At this point, three different cases can appear for breaking products' (BR PR) operations, summarized as it follows, where the first one depends on sale prices and the remaining on the average markup:

Figure 6

Eaton's operations

With catalog number (CN)	Within a given product category (Ct)	Other products	Formula		
✓			average OEM sales px for the BR PR CN	X	units transfered
X	✓		average OEM markup for the BR PR Ct	X	manufacturing costs for BR PR Ct
X	X	✓	average OEM markup for all BR PR Ct	X	manufacturing costs for all BR PR Ct

With the goal of simplifying the analysis, we will assume the existence of three catalog numbers (A1/A2/A3) and three product categories (B1/B2/B3), where "NA" will represents the other cases ("not applicable"). In addition, four different of sales operation can be perform:

- A: Assembly = with related parties
- D: Distribution = with USA third parties
- I: International = with foreign third parties
- O: Others = other business operations

2.2.2. DEPLOYMENT:

As explained before, one of the main issues about the Eaton case was the different sources of information that the company had. It did not count with a centralized system and in some cases the same data was processed for different people many times, or even stored in more than one ledger.

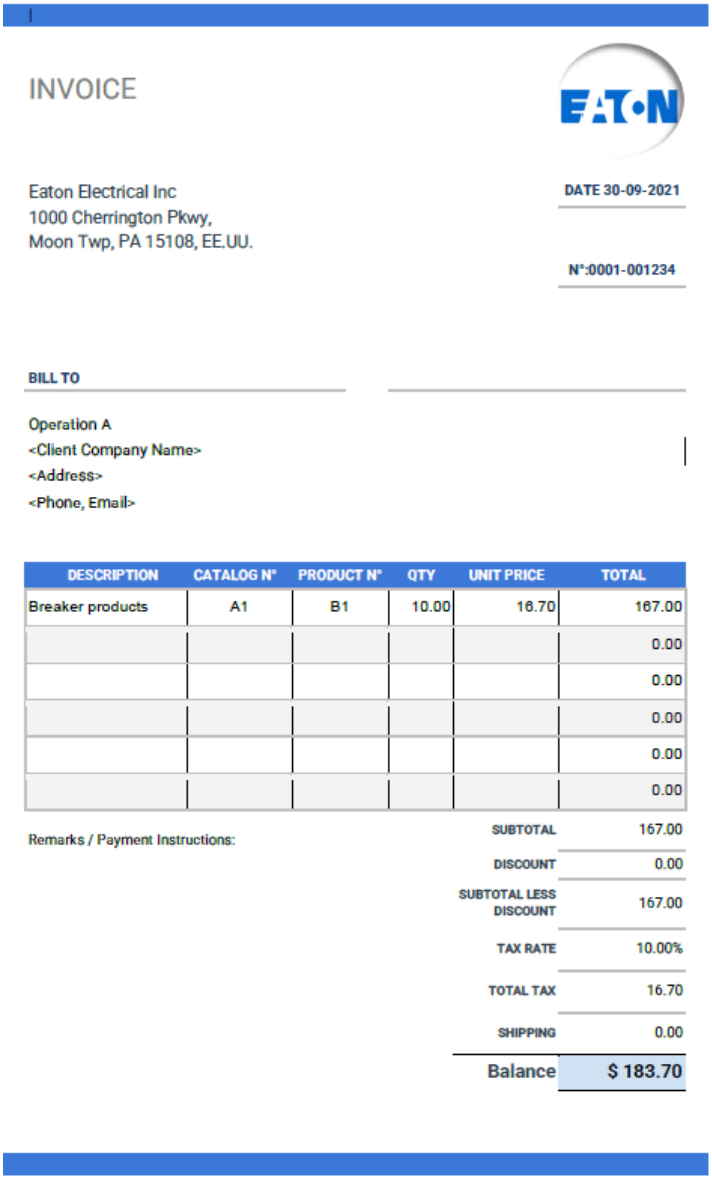
For those reasons, the idea at this point is to use artificial intelligence to get the information from one place, which would reduce the risk of duplication of the related information.

First, we need to identify a possible source of information that could contain the relevant data for our purposes, like the issued invoices. Then, using artificial we can extract what is needed.

At this point, an example of an invoice was created, in order to be presented as the input of the process:

Figure 7

Eaton's invoice



INVOICE

Eaton Electrical Inc
1000 Cherrington Pkwy,
Moon Twp, PA 15108, EE.UU.

DATE 30-09-2021

N°:0001-001234

BILL TO

Operation A
<Client Company Name>
<Address>
<Phone, Email>

DESCRIPTION	CATALOG N°	PRODUCT N°	QTY	UNIT PRICE	TOTAL
Breaker products	A1	B1	10.00	16.70	167.00
					0.00
					0.00
					0.00
					0.00
					0.00

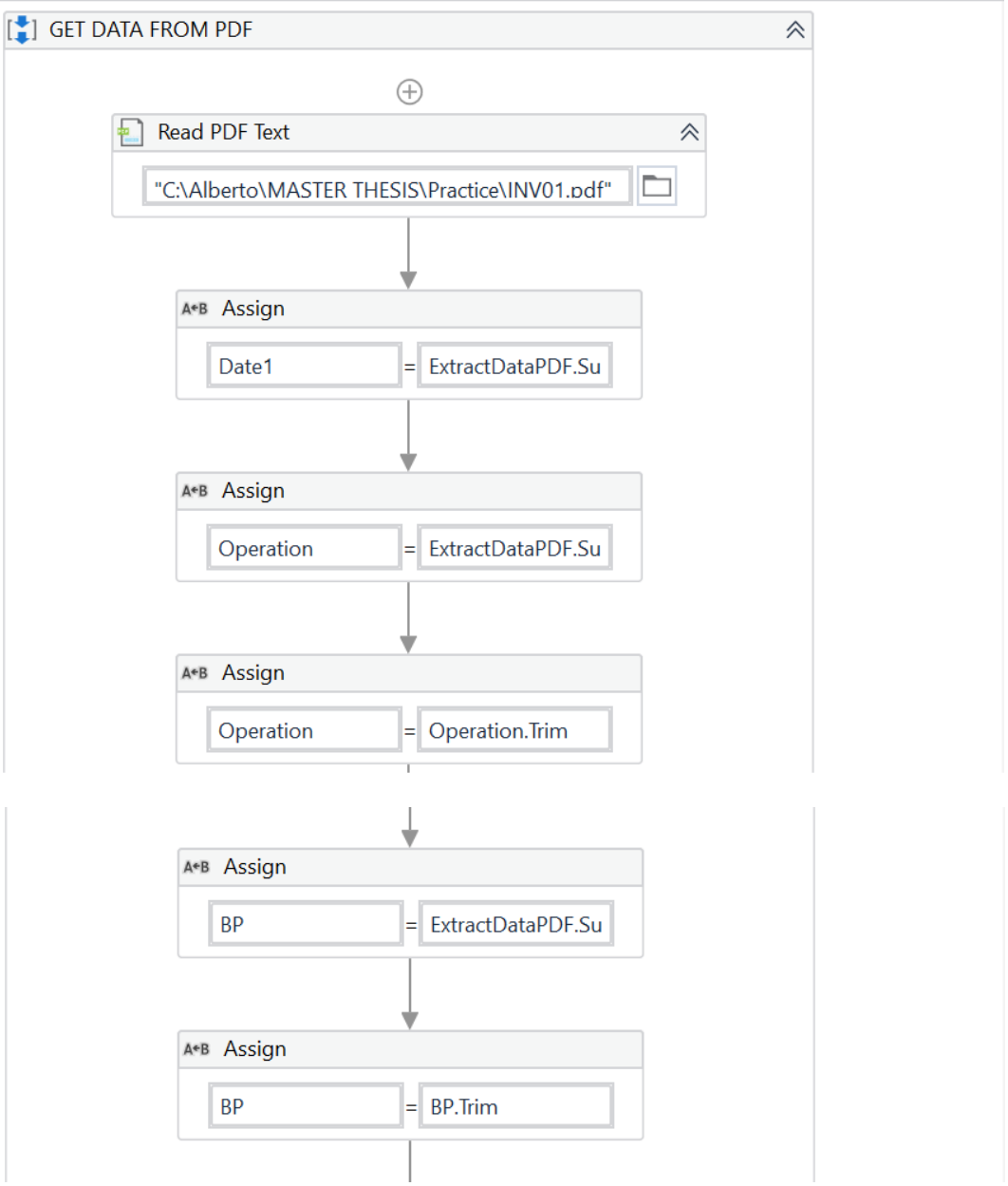
Remarks / Payment Instructions:

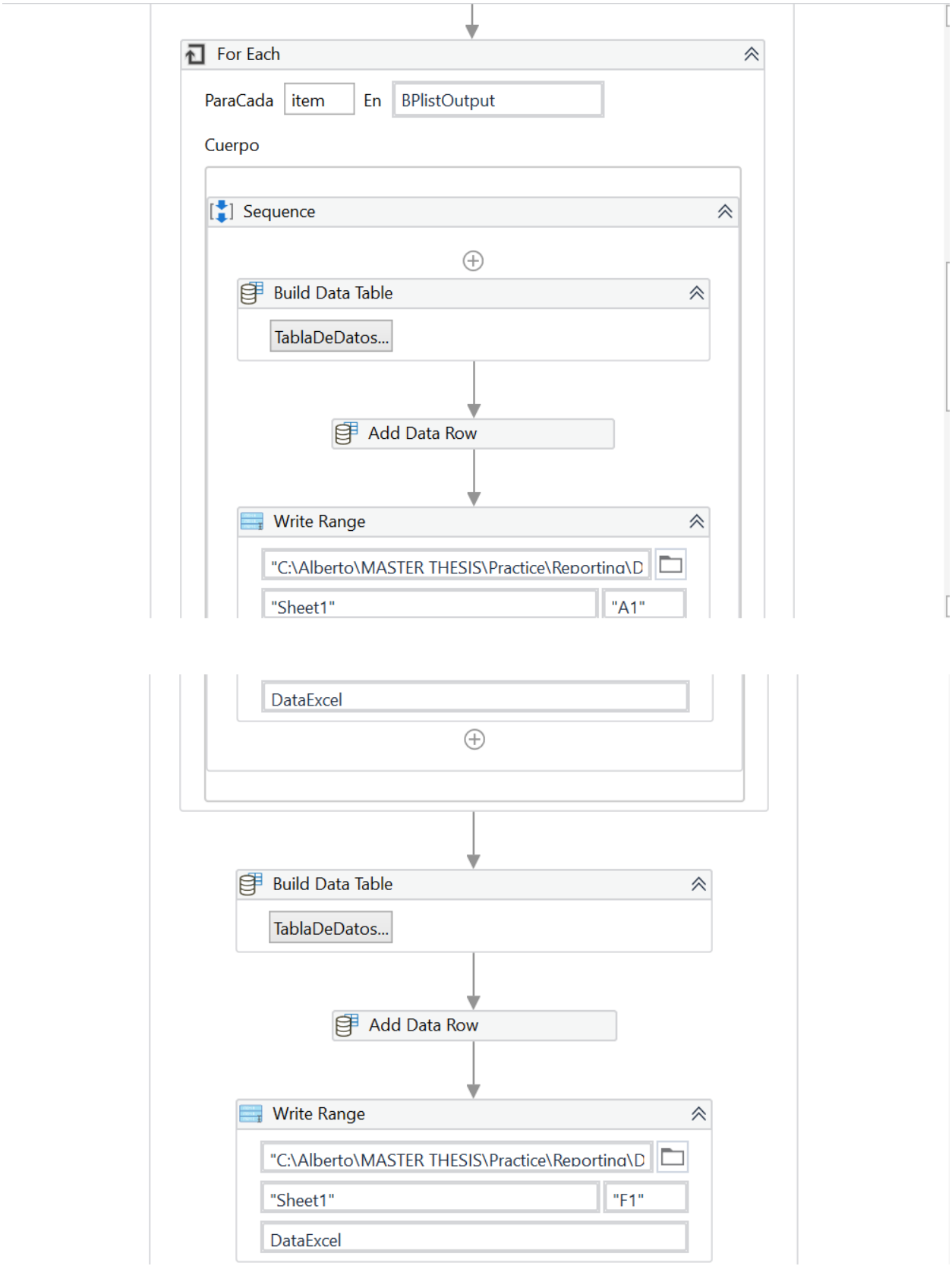
SUBTOTAL	167.00
DISCOUNT	0.00
SUBTOTAL LESS DISCOUNT	167.00
TAX RATE	10.00%
TOTAL TAX	16.70
SHIPPING	0.00
Balance	$ 183.70

Using a program called Uipath, a robot is developed with the ability to proceed as explained before. The programming algorithm should be something like:

Figure 8

UIPath Scheme




For Each
ParaCada item En BPlistOutput
Cuerpo
Sequence
Build Data Table
TablaDeDatos...
Add Data Row
Write Range
"C:\Alberto\MASTER THESIS\Practice\Reporting\D
"Sheet1"
"A1"
DataExcel
Build Data Table
TablaDeDatos...
Add Data Row
Write Range
"C:\Alberto\MASTER THESIS\Practice\Reporting\D
"Sheet1"
"F1"
DataExcel

2.2.3. EXECUTION:

Once the program is executed, the robot would complete automatically an Excel file as it follows:

Figure 9

Excel results (clean sheet)

Catalog N°	Product n°	Quantity	Unit Price	Total Price	Date	Operation
A1	B1	10.00	16.70	167.00	30-09-2021	A

If, instead of creating a new Excel file, we ask the robot to fill a predetermined Excel file, where the first seven columns are blanks, we can add the formulas we need in order to proceed with the calculations. If we repeat the process for different invoices issued in a certain period (for example: January 2021), we get:

Figure 9

Excel results (predeterminated sheet)

Catalog number	Product Category	Quantity transferred	Sales Unit Px	Total Price	Date	Operation	Markup	Markup multiplier	Revenue	St. Unit Cost	St. Total Cost
A1	B1	10,00	16,70	167,00	02/01/2021	A	123%	2,23	167,00	7,50	75,00
A2	B2	150,00	16,70	2.505,00	04/01/2021	A	123%	2,23	2.505,00	7,50	1.125,00
A3	B3	20,00	16,70	334,00	06/01/2021	A	123%	2,23	334,00	7,50	150,00
NA	B1	50,00	16,70	835,00	08/01/2021	D	123%	2,23	835,00	7,50	375,00
A1	B2	25,00	16,70	417,50	10/01/2021	D	123%	2,23	417,50	7,50	187,50
A2	B3	50,00	16,70	835,00	12/01/2021	D	123%	2,23	835,00	7,50	375,00
A3	B1	10,00	16,70	167,00	14/01/2021	D	123%	2,23	167,00	7,50	75,00
NA	B2	150,00	16,70	2.505,00	16/01/2021	D	123%	2,23	2.505,00	7,50	1.125,00
NA	B3	20,00	16,70	334,00	18/01/2021	D	123%	2,23	334,00	7,50	150,00
NA	B1	50,00	16,70	835,00	20/01/2021	A	123%	2,23	835,00	7,50	375,00
NA	B2	50,00	16,70	835,00	22/01/2021	A	123%	2,23	835,00	7,50	375,00
NA	B3	50,00	16,70	835,00	24/01/2021	A	123%	2,23	835,00	7,50	375,00
NA	NA	75,00	16,70	1.252,50	26/01/2021	A	123%	2,23	1.252,50	7,50	562,50
NA	NA	75,00	16,70	1.252,50	28/01/2021	D	123%	2,23	1.252,50	7,50	562,50
A1	B1	10,00	16,70	167,00	30/01/2021	I	123%	2,23	167,00	7,50	75,00

The grey columns represent formulas, while the yellow one the assumption made. That table would work as an input for the calculations needed to determinate the constructed income revenue:

- Standard unit cost: as the year is not over yet, a predeterminated cost is necessary for the purpose of the calculations. Then, this is one will be adjusted using variances to get the actual costs.
- Markup: ratio of Sales unit price over Standard unit cost.
- Markup multiplier: markup plus 1.
- Revenue: Quantity transferred times Sales unit price.
- Standard total cost: Quantity transferred times Standard unit cost.

Using that chart as an input again, we can develop the formulas we will need in order to get the calculations. In our case:

Figure 10

Calculations (part 1)

1 Constructed Intercompany revenue:	Type	Average Px	X	Units	=	Revenue	
	A1	16,70	X	10	=	167,00	
	A2	16,70	X	150	=	2.505,00	
	A3	16,70	X	20	=	334,00	3.006,00
	Type	**Av. Markup multiplier**	**X**	**Manufacturing costs**	**=**	**Revenue**	
	B1	2,23	X	375,00	=	835,00	
	B2	2,23	X	375,00	=	835,00	
	B3	2,23	X	375,00	=	835,00	
	NA	2,23	X	562,50	=	1.252,50	2.922,50
							6.763,50

It should be noted that the idea is to count with a spreadsheet that, once the information is extracted by the robot, the entire calculations are updated after a certain period, for example

monthly. After the constructed income revenue is calculated, the other data also appear in order to complete the constructed income statement:

Figure 11

Calculations (part 2)

2	US 3° parties revenue:	6.346,00
3	International sales revenue:	167,00
4	Cost of sales	- 11.090,25
5	Operating expenses (SG&A expenses)	- 1.725,95
		460,31

Points 2 and 3 will be calculated as the sum of the revenues for Distribution and International activities, respectively. Point 4 will be the result of the sum of the Standard Total costs plus the variances. Finally, point 5 will be an assumption.

That amount would indicate the revenue that the company should pay for the sale of breaker products, only if the two tests settled up in the APAs are successfully passed. Then, another spreadsheet will simulate the calculation for these goals:

Figure 12

Calculations (part 3)

1	Sales revenues	13.276,50			
2	Cost of goods	- 11.090,25	2.186,25	Gross profit (4)	
3	Operating expenses	- 1.750,00	436,25	Total profit (5)	
	Berry ratio	1,25	(4) / (3)	Between 1.2 and 1.27	OK
	Ratio	13,18%	(3) / (1)	Between 13% and 20%	OK

We can observe, in this case, that both exams meet the default parameters. On the contrary, if they do not fulfill, adjustments will be needed in order to get compliance.

2.2.4. COMPLETION

As we have seen so far, the transactions being made are recorded as rows over the same ledger. However, as identical copies of this file would be maintained in a couple of servers, it would turn to be a replicated database. Jayaram (2016) explains that, although there are multiple copies of the database, each copy is maintained in sync with the other copies and thus there is "only one truth, one fact at any given instant".

Every time a transaction is added, the hash appears: a cryptographically encrypted method that is created using the hash of the previous row and transaction details (content) being added. If we use a formula to concatenate the different data of every transaction in one line, we can use other one to calculate the hash, in order to simulate how the blockchain would work:

Figure 13

Blockchain

Content	Hash
01/01/2021A1B10000000001000000010,500000005,25A	dbc999e7e70f13437a1dcf1ddeb98a2c8b848b450b191159474c336d28b2223a
02/01/2021A2B20000000015000000001500000000000075A	65901b5eac7a1a529252f2d6e086dd9125d3ea7ee2fafbef836c539c445e4c53
03/01/2021A3B30000000002000000000020000000000010A	619e0440b05f7243184e2215cc09328581c8e55b91e836040eefdaaf263b6210
04/01/2021NAB10000000005000000000050000000000025D	01e7ba04115b54274efd6b24c4c70d9d12e89a02c939f1d56a3d4b26901cab0b
05/01/2021A1B2000000000250000000002500000012,5D	2a8b89611a832f970ae960ffbb005b3da9428766ff892408023d03428cb1c392
06/01/2021A2B30000000005000000000050000000000025D	df27b91d57c38fd5b210dce491ab9508de5ee4714e39d38896750b44a1ae0fef
07/01/2021A3B10000000001000000000010000000000005D	276157ee1c1c58b54ea82d551dc3bef99cd10b34aec08f64d96aa93e4aef1cfc
08/01/2021NAB20000000015000000001500000000000075D	b13cff473d9842269e92c36fd73013a7a230301019682e3c24de4aee6d970596
09/01/2021NAB30000000002000000000020000000000010D	830048e5d2782e890e87bbb641e0f6202a59a844ec77fb7685f0d897f3278922

Since Hash of one row is dependent on Hash of the previous row, every transaction added is dependent on the previous one and iteratively on all the others in the database. Thus, a chain of transactions gets born.

There are some cases where different people get involved and anybody who wants to make a transaction can add a new row to record it. When a contributor adds a row, usually not

only the name but also the time is signed against the transaction so the others can verify he was indeed the actual contributor.

But for our case, as the idea is to automate the process as much as it can be possible, the robot would act as the contributor and no need of verification is further needed. The Hash in this situation would assure that the data comes from the robot and that nobody has add information, except for it.

Finally, with these entire process, two goals are achieved:

A) Immutability: if any of the previous transaction is edited, then the Hash of that transaction and all the following transactions will change. In case somebody tries to commit fraud by changing previous transactions, then he will have to calculate the Hash of all transactions from the changed transaction to the latest transaction.
B) Collaboration: the information is made available automatically for the fiscal authorities, which can check the data as soon is registered. Also, it can be checked by the other personal of the company, who could make decisions in order to improve or modify the situation.

VI. CONCLUSIONS:

Cryptocurrencies have moved from an uncertain idea to a reality: every day, more and more people trade with them and even some countries (like El Salvador) have established Bitcoin as a legal tender.

If blockchain, the technology behind them, could have such an impact, why other areas could not benefit from it? Different needs of record and tracking transactions and information can be solved with this tool.

In this paper, the improvements over transfer pricing were discussed, starting from a theoretical to model, to finish with a practical real application. Of course, the above proposed procedure is a very simplified manner of explaining how blockchain works, through the use of Excel and similar tools. The actual technology is more complicated, and it can be implemented in innumerable ways.

Transfer pricing is one area of taxation that can be benefit from the automation of procedures: specially when an APA agreement gets involved - where the rules and tests are predeterminated – the costs of time and risks of mistakes can be both reduced. In cases where a big volume of information is handled, as in the Eaton case, the application of these digital tools is of greater importance.

Through the work, it was also proven the advantages of incorporating these technics when speaking about monitoring the situation month after month, instead at the end of the period, where not many solutions can be displayed.

However, some challenges still persist. Although the use of blockchain assures maximum security about the origin and immutability of the data, the question lies in the

acceptance from the tax authorities. Usually, they are very conservative and reluctant to the use of novelties, speaking about technology innovation.

Then, it is possible that tax authorities do not approve the procedure so easy: they may ask the taxpayer to support the integrity of the entire process, probably through an audit of the information systems.

On the other hand, the documentation that the taxpayer has to provide every year is legislated through certain norms, and tax authorities may not accept the information in a way that differs from them.

So, the question that the taxpayer has to ask himself is that if tax authorities may agree, totally or partially, with the idea of using blockchain and artificial intelligence for transfer pricing purposes. The simple rule of cost-benefit can shed some light: the procedure can be productive for the company, but only if the potential rewards expected from the application of this procedure are higher than the total costs associated.

In order to instruct the acceptation from the tax authorities, efforts at the international level are required. The OECD could assume an important role of guidance while establishing international standards for the design of a smart system for transfer pricing control. For example, a reform over the current TP Guidelines can fulfill that objective: one more annex can be included, with a set of rules about the technical and legal aspects of the process and the platforms and software available.

Until the international organisms pronounce on the matter, it was proven that the system may be an acceptable input for the confection of the documentation that has to be presented. In other situations, where even that possibility is ruled out for the tax authorities, it could work as a very rational estimation of the calculations, for internal aims.

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