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Challenges to the Assessment of Damages Claims Involving Crypto-Assets in Investment Arbitration

<https://doi.org/10.1515/gj-2019-0044>

Published online July 6, 2020



Abstract: This article addresses the particular challenges involved in valuing various types of crypto-assets as investments under treaty-based investment arbitration. The interaction of the international investment protection regime with crypto-investments has largely remained un-examined, even though increasing amounts of foreign investments have flown into the development of crypto-assets its related markets. The existing investment treaty regime is set to face significant challenges in grappling with crypto-assets as investments due to several distinct features that differentiate them from traditional asset classes. This issue is explored further in the article from the perspective of the principles governing damages under international law.

Keywords: arbitration, cryptocurrency, damages, investment

1 Introduction

The crypto-asset market has witnessed an exponential growth in recent years. In their various forms such as virtual currencies, security and utility tokens, crypto-assets have drawn considerable interest among financial institutions, transnational corporations and national governments. While investors are already pouring in billions of dollars into the market, a number of countries have initiated steps towards crypto legalisation and regulation. With increasing evidence of regulatory actions affecting crypto-asset valuations (Auer and Claessens 2018), it is foreseeable for investors to look for available protection against any negative shocks arising from regulatory action. The international investment agreement (IIA) regime, which provides substantive legal protections to foreign investors

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against adverse host-State actions, could soon become a forum for foreign investors affected by host State regulatory measures on crypto-investments.

Presently, there is limited research regarding the implications of crypto-assets as subjects of treaty-based investment disputes (Barnett and Treleaven 2018; Paulsson 2018; Senior 2019; Terrien and Kerjean 2018). There are currently no known investment arbitration cases concerning crypto-assets. However, some commercial tribunals have adjudicated over cryptocurrency transfer disputes, and in certain instances, recognised them as protected legal assets or property. Recent examples of this practice have emerged before arbitral courts based in Shenzhen (Zhao 2018) and Moscow (Helms 2018a). As dispute settlement between private parties as well as at the investor-State level becomes more prevalent, there are several challenges that adjudicators will have to face. The unique nature of crypto-assets and crypto-investment needs to be examined and understood in context of the investment protection regime, starting from the very first step of ascertaining whether such investments are protected by the existing legal framework.

In this paper, I focus on the particular challenges involved in the process of valuation of crypto-assets from a damages assessment perspective in investment-arbitration. One of the fundamental functions of arbitral tribunals in investment disputes is to assess and award compensation to foreign investors whose investments have been expropriated or diminished by host State actions that are in violation of treaty-based standards of investment protection. Over the past decades, tribunals have issued awards on hundreds of disputes covering a diverse range of investments and underlying assets. At the stage of damages assessment, tribunals examine party submissions that are based varied methodologies developed for the assets at issue. Most of the commonly used valuation approaches in investment arbitration are categorised under market, income or asset-based methods, determined largely by the nature of investments in dispute. However, as I discuss in this paper, these valuation approaches are likely to face methodological challenges when assessing crypto-assets, making it difficult for tribunals to determine correct valuations that fulfil legal standards of compensation. Tribunals would therefore need to develop a nuanced understanding of the crypto-assets and their operation in question in order to be able to discharge their obligation of ensuring fair compensation to claimant-investors.

Section 2 begins with an introduction to crypto-assets and their rising popularity in the investment market. In Section 3, I describe the possible means by which crypto-investments will become the subject of disputes in international arbitration. Then, in Section 4, I explain the legal framework for calculating damages under investment law before proceeding to the specific valuation approaches in Section 5. This is followed by an analysis of the principal challenges of a) classification of crypto-assets and b) adopting a suitable valuation approach in

Section 6. I discuss the possibility of new and alternative frameworks for valuation of damages under Section 6, followed by my conclusions in Section 7.

2 The Crypto-Asset Investment Market

While consensus on a singular legal definition of crypto-assets is currently lacking, most stakeholders agree on three essential characteristics: crypto-assets are *digital assets*, utilising *public, permission-less distributed ledgers* that are secured using *cryptographic functions* (Daniel and Green 2018). While digital assets of various types have existed for decades, crypto-assets are unique in terms of their purported functionality as a medium of exchange (like fiat currencies) without necessitating centralisation of any kind. Distributed ledgers allow participants to be the ‘witnesses’ to transactions, with cryptography providing the necessary layer of security and trust among the participants who are largely unknown to each other. Digital ledger technology, with blockchain as a particular type, has proven to be revolutionary in terms of how economic transaction and exchange can take place between entities. Crypto-assets in their various forms – currencies, commodities, utility and transactional tokens – provide a wide number of functionalities that aid various forms of economic exchange. Due to their popularity and perceived functionalities, crypto-assets have themselves emerged as a major class of financial assets. The total market capitalisation of the cryptocurrency market stood at over \$251 billion in April 2020, facilitated by exchanges and trading services around the world. The interest that has risen for crypto-assets is therefore two-fold: first, as an alternative to traditional national currency-driven system of trade, investment and financing, and second, as a subject of investment.

The rapid emergence of the crypto-asset market within a very short time period has meant that most market participants, investors and regulators continue to play catch-up in terms of understanding the various factors that drive the market’s growth and pricing of various tokens and currencies. In many cases, periods of extreme volatility are caused by trading volumes raised artificially (Fusaro and Hogan 2019), fraudulent coin offerings (Avakian and Peikin 2018) and rumour-fueled speculation (Hjaric 2019). State reactions to these occurrences have been varied, ranging from outright bans on crypto-asset trading to a more laissez-faire approach, allowing the market to evolve at its speed. Intergovernmental organisations such as the Financial Stability Board and OECD have been actively engaging with state agencies in identifying focus areas for investor protection and developing the necessary regulatory framework. With increasing participation of institutional investors, multinational corporations and banks, there is said to be an

increasing exposure to the existing risks of crypto-investments that would need to be addressed urgently (Financial Stability Board 2018).

Despite all of its popularity among market participants, there exists a high degree of uncertainty regarding the nature of the crypto-asset market, the security of the assets in the digital marketplace and the risks associated with speculative trading (Financial Stability Board 2019). One of the important questions for researchers in this sector has been with regard to the pricing of crypto-assets in the market and the principal factors determining the same. Unlike traditional financial products, crypto-asset markets have only begun to be analysed and ways for their regulation being discussed by governments and international organisations. The emergence of new funding strategies such as initial coin offerings (ICOs) for projects with very little due-diligence or supervision has led to concerns about major financial risks that could emerge in the future. The reaction at the state level, however, has been varied across countries. Some states have been faster in adapting to the crypto-asset trend and have developed regulations and laws seen as friendly towards crypto-asset investors. Others have focussed on the technological aspects of crypto and blockchain and have developed government programmes that support innovation the field. As investor participation continues to rise in the field, there is increased attention towards measures for enhancing transparency and certainty in the market as well as mitigating legal and financial risks for participants and intermediaries (Darbyshire 2019).

An emergent thread of discussion on the uncertainties associated with crypto-assets is their possible impact on legal disputes. A rising number of cases have emerged before various jurisdictions that involve crypto-assets as the subject of disputes. These disputes have covered a wide range of issues: securities, consumer disputes, bankruptcy, creditor lawsuits, and contract disputes, among others. The continuing discussion on pricing of crypto-assets has important implications in this respect, as it is quite likely that financial losses involving such assets would need to be reviewed by adjudicators in order to calculate the compensation due. As we will see in the succeeding sections of this paper, the established process for assessment of damages claims are likely to face methodological difficulties due to uncertainty in determining the value of crypto-assets free of excessive speculation and uncertainty. A number of recent research works have suggested that existing financial models for valuation may not be well suited to measure crypto-asset prices due to the distinctive nature of the assets and the networks in which they are traded. There exists a gap in the understanding between the legal standards for compensation for damages claims and the methodological tools available in evaluating these claims.

3 The Interaction Between Crypto-Investments and International Arbitration

Crypto-assets have emerged as a major draw for foreign investment in recent years. In various forms, such as establishment of cryptocurrency-exchanges, investment funds and most popularly through ICOs, foreign investment has emerged as a major driver of the ‘crypto-boom’ (Maister 2018). ICOs have emerged as a major funding strategy for start-up companies where they issue their own tokens to investors in exchange for crypto or fiat currencies. Companies issuing ICOs can therefore fulfil their funding requirements completely within the crypto ecosystem, creating a distinct blockchain-driven investment market that does not rely on traditional financial markets. In the last two years, the ICO market has witnessed exponential growth that has undoubtedly benefited from the growing popularity of cryptocurrencies. In 2018, over concluded 2284 ICOs raised almost \$11.4 billion, up from over \$10 billion raised in 2017 (Pozzi 2019). These offerings were spread across sectors such as the creation of new blockchain networks, software services, banking, entertainment and infrastructure.

Aside from investors, governments in several countries like Japan (Pollock 2019), South Korea (Helms 2018b), Switzerland (Sakovich 2018) and Malta (O’Neal 2019) have taken crucial steps towards formalising the cryptocurrency market along with its regulation. As regulatory eco-systems begin to take shape in countries around the world, an important consideration for all stakeholders involved would be the impact of new regulation on the value of new and existing crypto-investments. While crypto-assets have operated in a legal grey area in most countries, the effects of formalisation and greater scrutiny into crypto-transactions would certainly affect ongoing trading volume and thereby, the perceived value of crypto-assets (Corbet et al. 2018). Courts and commercial arbitration tribunals have already begun to witness the first wave of litigation involving crypto-assets (Smith 2018). Token purchase contracts have emerged as one key area where dispute settlement processes will play a role, as evidenced by the recently settled suit between two cryptocurrency companies, Ripple Labs and R3 (Wilmoth 2018).

The scope of international investment law (IIL) and dispute settlement (through investment arbitration) as legal mechanisms for the protection of rights of foreign investors in crypto-assets remains untested. While the consideration of digital assets as ‘investments’ under IIL has come under increased prominence in recent years, the implications for international legal protection of crypto-assets are less clear (Chaisse and Bauer 2019). Particularly, the existence of the crypto-asset market largely outside the realm of domestic or transnational law and regulation has posed crucial questions about whether IIL can truly govern the protection of

these assets. Commonly applied analogies such as jurisdiction, market, cross-border transaction etc. do not place themselves neatly into discussions on crypto-asset trade and investment. Therefore, whether foreign investors can successfully seek protection from harmful State actions within the IIL regime will actually be tested when disputes are filed eventually.

As the question of whether crypto-assets can be considered as protected investments under IIL is fundamental to the discussion on damages in this paper, Section 3.1 provides an overview of the considerations involved. For an arbitral tribunal appointed to resolve investor claims, the question of crypto-assets as investments would be fundamental to establishing jurisdiction over the dispute.

3.1 Establishing Jurisdiction: Crypto-Assets as ‘Investments’ Under Treaty Law

Theoretically, some of the more broadly worded definitions of ‘investment’ under many investment treaties leave open plenty of room for interpreting different types of crypto-assets as investments under sub-classes, such as currencies. For example, Article 1.1 of the Netherlands-China Bilateral Investment Treaty (BIT) defines investment as follows:

“The term ‘investment’ means every kind of asset invested by investors of one Contracting Party in the territory of the other Contracting Party, and in particular, though not exclusively, includes:

- Movable and immovable property and other property rights such as mortgages and pledges;
- Shares, debentures, stock and any other kind of participation in companies;
- Claims to money or to any other performance having an economic value associated with an investment;
- Intellectual property rights, in particular copyrights, patents, trade-marks, trade-names, technological process, know-how and goodwill;
- Business concessions conferred by law or under contract permitted by law, including concessions to search for, cultivate, extract or exploit natural resources.”

Considering that crypto-assets are often categorised under diverse asset classes such as commodities, securities and even collectibles, it is functionally not difficult to consider them as covered investments under asset-based definitions. Such broad and open-ended definitions of investment leave open plenty of room for crypto-asset investments to be considered as ‘protected’ investments, though

subject to the question of legality in the host-State. These definitions are very commonly across a large number of over 3000 investment treaties that are currently in force globally. Additionally, reference is also made to the Convention on the Settlement of Investment Disputes between States and Nationals of Other States (or ICSID Convention) where the determination of jurisdiction is laid down under Article 25(1) as follows:

The jurisdiction of the Centre shall extend to any legal dispute arising directly out of an investment, between a Contracting State (or any constituent subdivision or agency of a Contracting State designated to the Centre by that State) and a national of another Contracting State, which the parties to the dispute consent in writing to submit to the Centre. When the parties have given their consent, no party may withdraw its consent unilaterally.

Assuming that all other factors are correct, the principal determination for the tribunal is whether there is an actual ‘investment’. Recent legal scholarship has raised the premise of crypto-assets (like cryptocurrencies) as constituting ‘investments’ under most commonly used definitions in investment treaties (Agarwal and Bajpai 2019). It has been argued that not all forms of crypto-assets may be classifiable as investment, particularly with respect to the territoriality requirement, i. e. for the investment to have been made in the territory of the host State. Crypto-assets, particularly cryptocurrencies, are created, held, stored and transferred on the blockchain, with no obvious territorial nexus. While the chain of ownership of tokens can be traced on public blockchain networks, the process of creation/authentication of the tokens can take place at multiple locations globally. Thus, foreign investors are likely to face this dilemma when seeking to attain legal protection of their investments under treaty law.

It is argued that while certain classes of crypto-assets (such as cryptocurrencies traded on large public blockchain networks) might not fulfil the requirement of territoriality, other types of commercial or enterprise activity may still qualify. Investment in enterprises funded via crypto-based coin offerings (ICOs) possibly comprises the biggest market in this respect. ICO-funded commercial enterprises have (though not in all cases) physical presence, including registered offices, staff, capital assets etc. whose territorial nexus can be established. Further, many ICO-funded cryptocurrency exchanges providing world-wide services also have physical presence in terms of offices, server locations etc. Depending on the kind of token issued, ICOs can often be closely compared to issuance of securities by companies, with investors gaining ownership/voting rights proportional to their investment. Therefore, in such scenarios it is likely that foreign investment in such enterprises will qualify as protected investments under existing definitions.

It is also argued that crypto-investments of the form of coin offerings or similar enterprises would satisfy some of the commonly applied criteria to establish the existence of an investment under IIL. In the often evoked *Salini test* (or *Salini criteria*), arbitral tribunals consider four characteristics of investment: (i) contribution of money or assets (ii) duration of investment (iii) element of risk (iv) contribution to economic development of host State. These criteria were initially formulated by the arbitral tribunal in the investment dispute concerning *Salini Costruttori S.p.A. and Italstrade S.p.A. v. Kingdom of Morocco*¹. While the *Salini test* is by no means a universally accepted standard, it provides a useful checklist for what tribunals are likely to consider. A hypothetical case of an ICO investment would arguably fulfil the *Salini criteria*. Contribution of money or assets takes place in the very act of investing by the foreign investor, either in fiat currency or through existing tokens. A possible dilemma here is whether a transaction involving a foreign investors tokens as purchasing units in exchange of the issuing enterprise's tokens constitutes a legally valid transaction. This would again be governed largely by the domestic law of the country where the enterprise is established. A jurisdiction where crypto-transaction is legal would therefore pose no problems. Secondly, the requirement of duration is largely industry-specific. In crypto-investing, similar to other forms of financial investments, shorter durations are the norm and it is unlikely that arbitral tribunals object on the question of time. Third, the element of risk is largely inherent to all forms of crypto-asset trade, as broadly recognised in the market (Chimienti, Kochanska and Pinna 2019). Ranging from issues of price fluctuations, supply-demand information asymmetry and regulatory uncertainty among others, foreign investors would be undertaking significant risk in any investment activity with crypto-assets at issue. Fourth and perhaps the most controversial characteristic is that of economic contribution to the host State. Here, tribunals have largely abided by relatively open interpretations of economic contribution to the host State economy, with some even choosing to remove this criterion (Grabowski 2014). As a general argument, however, it may be stated that by contributing to the growth and development of enterprises within the host State, foreign crypto-investors are contributing to economic development in several ways. Most apparent is the infusion of capital in the host State and development of the crypto-asset market domestically. There is therefore *prima facie* a strong case for why foreign investment in ICOs will pass the requirements set in BIT definitions and as laid down under the *Salini test*.

¹ *Salini Costruttori S.p.A. and Italstrade S.p.A. v. Kingdom of Morocco*, ICSID Case No. ARB/00/4, Decision on Jurisdiction, para 52 (Jul. 23, 2001).

3.2 Legal Disputes: State Actions and Their Impact on Crypto-Investments

Given that a foreign investor's crypto-assets are determined to be investments under treaty law, an arbitral tribunal would have to turn to the legal dispute in question in order to cement its jurisdiction over the investor's claims. As seen from Article 25(1) of the ICSID convention, 'any legal dispute' provides a broad scope for arbitrators to determine their jurisdiction to decide on investor claims. Similarly, in BITs and other IIAs the dispute settlement mechanism is commonly made available for 'any dispute' between the host State and investor arising out of the investment made by such investor. In certain new-generation treaties, the scope of disputes is defined as those arising from the breach of specific investment protection standards as provided in the investment treaty. For instance, Article 3.1.1 of the EU-Singapore Investment Protection Agreement (2018) lays down the scope of investment disputes as follows:

This Section shall apply to a dispute between a claimant of one Party and the other Party concerning treatment alleged to breach the provisions of Chapter Two (Investment Protection) which breach allegedly causes loss or damage to the claimant or its locally established company.

The standards of investment protection are derived from multiple sources of international law, including customary law for the protection of legal rights and property of foreign citizens. Without going into an explanation of the standards of protection, it may be summarised here that investment treaties usually contain a number of such standards including fair and equitable treatment, most-favoured nation, full protection and security, national treatment of the foreign investors and their investment. They also generally prohibit expropriation of such investment, except under specific conditions as laid down in the treaty. When foreign investors perceive a breach of such investment protection standards arising from an action or set of actions of the host State, they can claim compensation or damages for the losses suffered as a consequence of such state actions using the dispute resolution process.

Investment disputes have arisen out of a variety of State actions over the years, ranging from administrative, regulatory, and judicial acts to different forms of expropriation of investor assets (Montt 2009). Investment protection standards in treaties are generally worded vaguely, allowing investment tribunals to examine a wide range of State actions for possible breach. While the move towards investment treaty reform in recent years has led to more precise treaties with set boundaries of applicability of investment protection standards, their efficacy still

remains to be tested comprehensively. In this context, the possibility of crypto-investment disputes and the possible nature of such disputes are largely subject to speculation. Particularly, due to the lack of existing legal and regulatory frameworks for crypto-assets in most States, it is difficult to determine the trajectory of possible actions that States would take in the future. It has been seen that some States have attempted to include crypto-assets within the ambit of certain issue areas like taxation (Jagati 2019) and anti-money laundering (Robinson 2018).

Certain assumptions can still be made on the types of legal disputes that are likely to arise, assuming that crypto-investments are legalised and regulated in a host-State. Firstly, regardless of the decentralised nature of crypto-assets, governments would still be able to shape the market for crypto-asset trading through law and policy. Starting with the most fundamental powers of legalisation/de-legalization, possible State actions over crypto-assets can cover a wide variety of issues such as tax policy, corporate governance, incentivisation measures, banking and finance regulation etc. Secondly, enterprises that derive their financing via ICOs or are pre-dominantly engaged in crypto-asset trading would be subject to national laws and regulations where they operate, regardless of the decentralised platforms over which they might operate. Thirdly, foreign investors as shareholders who might be financing using crypto-assets would also be subject to a host of State regulations that could impact on their shareholding value as well as the crypto-assets involved. Thus, while it may be difficult to provide particular instances at the current nascent stage of crypto-asset regulation, it is foreseeable that crypto-investments and State actions will see substantial interactions.

Even in the case of dispute settlement processes like arbitration, it has been suggested that traditional mechanisms might not be suited to blockchain, and alternative models might emerge in the near future. At the same time, existing dispute settlement systems are being used in the ongoing ‘first wave’ of crypto-disputes and are likely to do so for the time being. The issue of damages assessment is particularly important because: a) rules for assessing damages are not as reliant on development of legal standards for crypto-assets and b) it has relevance beyond the investment law paradigm and reaches into commercial arbitration, litigation and other forms of dispute settlement as well. This paper is, therefore, an attempt at understanding the challenges that arbitrators and adjudicators in general are likely to face when assessing crypto-assets as the subject of legal claims.

In this paper, I assume a simplified scenario where a foreign investor has raised a dispute against a host State for a regulatory act that adversely affects the value of its invested crypto-assets in the host State, under an existing investment treaty. The chain of determinations for a constituted arbitral tribunal under an appropriate investment treaty would be as follows (see Figure 1):

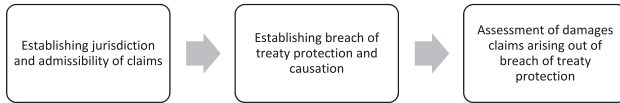


Figure 1: Principal Determinations to be made by an Arbitral Tribunal.

While at each stage of determination, an arbitral tribunal will face difficult and novel questions based on the peculiar nature of crypto-assets, in this paper I focus only on the third stage, i. e. the determination of quantum of damages to be paid by host State for breach of investment protection standards. In order to highlight the particular methodological challenges that are likely to arise when crypto-assets are involved, I begin with a discussion on damages valuation in investment arbitration.

4 Calculation of Quantum of Damages

The principles governing damages for breach of investment protection standards under treaty law are well settled (Marboe 2017, 10–17). The function of damages is to repair the harm caused by any unlawful State action. The internationally recognised standard is derived from the *Factory at Chorzów* case, which provides that reparation shall ideally put the injured person in a financial situation that he or she would be in, if the act had not been committed². This is also often termed as the ‘full reparation’ principle. While the principle prescribes reparation to be in the form of restitution of damaged assets/property, where this is not possible, it may be carried out through monetary compensation. In practice, most courts and tribunals follow the latter route, as restitution is often impracticable or onerous. This full reparation principle is the general standard applied by arbitral tribunals when adjudicating damages claims, regardless of whether damages claims are treaty-based or arising out of investment contracts. This was also codified under Article 31 of the International Law Commission’s Articles on the Responsibility of States for Internationally Wrongful Acts³. Over the last two decades during which most investment arbitrations have been conducted, tribunals have largely followed the *Chorzów* standard of full reparation. The question then arises as to how the amount of reparation is to be calculated. The process of quantifying damages involves the following sequence of steps (see Figure 2):

² *Case Concerning the Factory at Chorzow*, PCIJ 1928 Set A, No. 17, 47.

³ UN GA No. 56/83 of 12 December 2001.

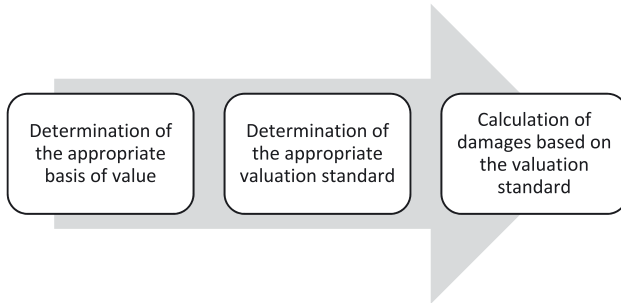


Figure 2: Steps Involved in the Calculation of Damages.

Once an appropriate basis of value has been decided (such as the full reparation principle), selecting an appropriate valuation standard is therefore critical in determining the amount of damages that would fulfil the full reparation principle. It is also equally important in ensuring that the investor is not unjustly enriched or overcompensated for the harm done. This can often prove to be problematic because the full reparation principle as laid out in *Chorzów* makes it necessary to build a hypothesis of the probable situation that the injured investor would have been in absence of the unlawful State act. The said hypothetical situation must then be compared with the investor's actual situation. This difference between the hypothetical and actual situation constitutes the damage caused and has to be compensated in its entirety under the full reparation principle.

At this point it is also important to draw the attention to the fact that not all investment disputes arise from investment treaties, and therefore reparation standards might differ on the basis of the applicable law over a given dispute. In the case of disputes arising from investment contracts, the applicable law may be defined as the national law of the host State or a separate jurisdiction. In such cases, the standard of reparation for losses incurred would be governed by the standard defined by the domestic law. Although the principal of full reparation is widely accepted across the world under domestic law and under international conventions such as the United Nations Convention on Contracts for the International Sale of Goods (CISG), a tribunal would still need to be mindful of the principles laid down under the applicable law governing the dispute. For the purpose of this paper, only the international law standard of full reparation is examined.

Since the full reparation principle is based on making good the loss of value (of assets) *to the investor*, it implies that the standard for valuation is not an objective but a subjective one. Therefore, the choice of the valuation standard has to consider, to the extent possible, the investor's financial position. However, in

instances of legal expropriation of the investor's assets rather than harm caused by State action, the standard for reparation commonly applied is an objective standard: that of the fair market value of the expropriated property/asset. The fair market value (or FMV) analysis does not require the assessment of the disputing investor's financial position. Rather, it aims to provide an objective valuation of the asset that has been expropriated on the date of such expropriation. Further, it should be noted that not all tribunals have universally strictly maintained these distinctions when evaluating reparation claims under international law (Marboe 2017, 95–98). In several cases, objective criteria such as FMV have also been used to quantify losses arising from breach of investment treaty standards. While there has been an increasing consistency in the position of arbitral tribunals regarding the applicable standards in recent years, the significant discretion exercised by tribunals in deciding or even modifying the applicable standards is notable.

With this in mind, I briefly discuss the principal valuation approaches used to carry out business valuations as well as in investment arbitration below.

5 Market, Income and Cost-Based Approaches

At the stage of damages valuation, disputing parties usually engage valuation experts in preparing detailed submissions on claims. The valuation approaches used by experts depend on the number of factors concerning the dispute at hand, such as available financial information, type of asset being valued, actual or assumed state of the asset etc. Therefore, parties can often adopt multiple valuation approaches, mixed approaches or scenario-based assessments. For instance, the International Valuation Standards (IVS) recognises three distinct approaches to business valuations such as the market approach, income capitalisation approach and asset-based valuation. The three categories of valuation approaches allow for a broad range of factual scenarios and available financial information.

The market or sales comparison approach provides an indication of value by comparing the assets at issue with identical or similar assets for which price information is available. It relies on benchmarks of value derived from similar assets to derive a multiple used for establishing the value of the subject asset. Factors such as stock performance, cash flow etc. are often used as determinants (Saunders, Arora and Skilton 2017, 186–194). The central element to the use of the market approach is comparability, therefore necessitating a market with a large number of similar participants and transactions that would provide clear and unbiased information on pricing. This is often an issue in foreign investment cases, where businesses in question are often large and unique projects (such as in the energy,

infrastructure sectors) that make it difficult to find comparable projects (Abdala 2017, 321–333).

The income-based approach attempts to use methods that convert anticipated economic benefits from a business, asset or security into a single present value amount (Kantor 2008). The most commonly used income-based approach is the discounted cash flow (DCF) method, which finds the present value of expected future cash flows using a discount rate. A present value estimate is then used to evaluate a potential investment. Income and DCF valuations therefore provide a forward-looking approach to valuation, assuming that the assets held by the investor have the ability to generate profits for the investor. This naturally limits the type of assets that can be valued accurately, with implications for crypto-assets that we will see later.

The third major valuation approach is the cost or asset-based mechanism. It is based on the economic principle that the price that a buyer would pay for an asset will not be more than the cost to obtain an asset of equal utility. Therefore, asset-based approaches use methods based on the current market value of assets net of liabilities. In contrast to income-based methods, this approach looks backward rather than forward and is therefore less speculative in nature. At the same time, a major disadvantage of this approach lies in the fact that assets and liabilities may not be accurately recorded in financial statements, especially considering that the book-value of assets is usually recorded with specific accounting and taxation purposes.

Over the years, numerous arbitral tribunals have established and cemented this general framework for assessment of damages. Since investment treaties generally do not contain provisions governing assessment, the task is usually left to the tribunal's discretion. Since the amount of damages is one of the most critical components of the award, tribunals and parties often engage the assistance of valuation experts in carrying out the task. This process has also significantly evolved over the years, with arbitrators gaining increased experience and sophistication in complex issues in valuation. While the current system has served the disputing parties well in disputes involving a wide range of foreign investments, the emergence of crypto-assets as new class of investments poses a variety of interesting new questions. As I discuss in the Section 6, crypto-assets operate within a distinct financial eco-system, and as such, are difficult to value using existing traditional techniques. Arbitrators in future investment disputes that substantially involve crypto-assets will need to consider these peculiarities when assessing claims for damages.

In order to understand why crypto-assets might provide a particular challenge to arbitrators, I will provide an assessment of the nature of crypto-currencies and the valuation processes adopted for them in the Section 6.

6 Principal Challenges in Damages Assessment

While most arbitral tribunals apply the widely accepted legal principles for damages assessment, the task can often be challenging due to the assets in question. Physical assets are generally easier to assess in comparison to intangible assets whose price drivers can often be opaque. Physical goods have a tendency towards standardisation in value, while digital assets show a high degree of variance on the basis of utility, market and user perceptions, etc. This poses practical difficulties in damages assessment, where tribunals are often tasked with understanding the factors influencing loss of investment value. As discussed earlier, the crypto-asset market as a largely unregulated sector can often be difficult to assess in terms of demand-supply shifts, price drivers and other allied factors that are far more apparent in traditional financial asset markets. Additionally, crypto-assets display a high degree of heterogeneity in terms of their nature, utility and function. Thus, establishing loss of value can often lead to a high degree of speculation creeping into calculations, and it is something that arbitrators need to be well aware of. The principal challenges in applying the process of damages ascertainment are two-fold: (i) identifying an ideal classification mechanism of crypto-assets in order to identify the factors affecting value (ii) implementing an appropriate valuation mechanism that is able to identify and quantify the amount of loss sustained from unlawful state action. These challenges are discussed as follows:

6.1 The ‘Classification’ Challenge

One of the first challenges that come with assessing crypto-assets is identifying a proper classification mechanism. Due to the diverse forms in which tokens exist and the varied functions performed, it is difficult to classify them as any single asset group, such as currencies. There are significant differences among crypto-tokens based on the issuer’s goals for their design and functions. The meteoric rise in popularity of crypto-tokens has also been accompanied by fragmentation of the market on the basis of the distinct characteristics of coin types. Thomas Euler of Untitled Inc., a distributed economy think tank, developed a useful classification that visualises crypto-tokens into five ‘dimensions’ (see Figure 3 and Table 1):

The five dimensions also provide an apt visualisation of the differing types of crypto-tokens and the functionalities that they provide. These differences also coalesce in the varied pricing dynamics of tokens, with factors of demand/supply, underlying asset values, legal status and functionality playing a critical role. These dynamics are critical from a dispute resolution perspective, where valuation of any

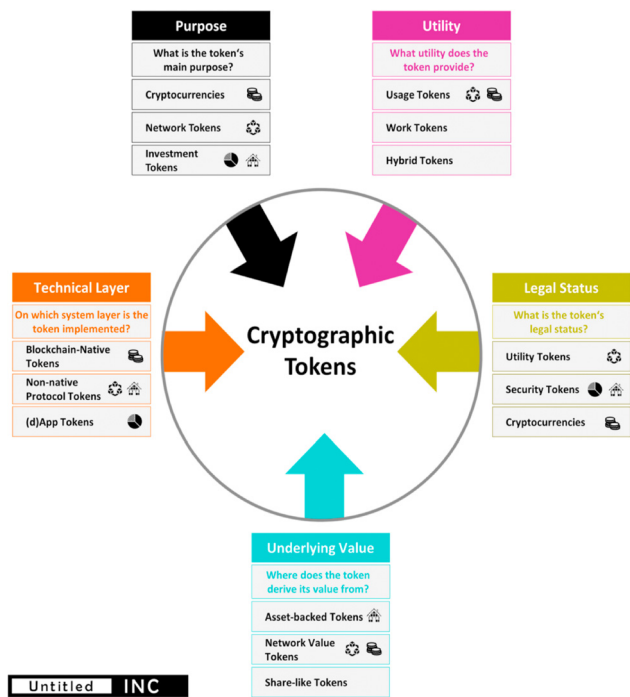


Figure 3: Five Dimensions of Crypto-Token Classification (Euler 2018).

claims for losses would necessitate the availability of data to adequately measure the impact of an adverse action. For a hypothetical injured investment, a functional classification of investor's tokens at an early would therefore be critical for assessing the extent of damage caused by an unlawful State act. On this basis, the tribunal can adjudge the valuation standard and approach necessary to ensure full reparation to the investor to the best extent possible.

Practically, this process of will be difficult without a legal classification framework already in place. Currently there is no consensus at the national or international level within States regarding the legal basis of token classification (Whittaker and Reid 2018). This is not surprising, considering the varied opinions among financial regulators regarding the very nature of crypto-assets in the first place. The European Securities and Markets Authority (ESMA), for instance, issued an advisory statement discussing the substantial risks to investors from the lack of a legal framework and classification of crypto-assets (European Securities and Markets Authority (ESMA) 2019). Through an internal survey with National Competent Authorities (NCAs) of Member States, the ESMA highlighted the

Table 1: Principal Types of Crypto-Assets and Their Utility.

Crypto-asset	Sub-types	Utility
Cryptocurrencies	Standard coins	Medium of exchange/mode of payment, store of value, unit of account
	Stablecoins/Asset tokens	Similar functionalities as cryptocurrencies but backed by reserve assets
Non-currency tokens	Utility Token	Usage for particular purposes assigned usually within the platform or application wherein they are created
	Security/Equity Tokens	Tokens that perform functions similar to traditional securities, such as providing ownership/shareholder rights
	Work Tokens	Provide access to a network and cash flow potential on the basis of work done/tasks performed with the token
Platform Tokens	Hybrid Tokens	Perform functionalities of two or my types, such as utility as well as security
		Provide access to digital platforms for creation/usage/ trade of other crypto-asset types
Crypto-collectibles		Limited availability assets with each individual unit carrying distinct value

functional differences among crypto-tokens as the possible basis of differentiating certain crypto-tokens as ‘financial instruments’ from others (European Securities and Markets Authority (ESMA) 2019, 14–21). Similarly, the European Banking Authority (EBA) addressed the legal classification problem as a key factor behind the applicability challenges of EU financial services laws on crypto-assets. Categorising the ambit of EU financial services law as either under financial instruments, electronic money or none of the foregoing, the EBA opined that a significant proportion of activities involving crypto-assets do not fall under the current ambit of the financial services laws (European Banking Authority (EBA) 2019, 15).

In the absence of a classification mechanism, the biggest challenge for tribunals would be to assess the distinctive pricing-dynamics of various types of crypto-tokens. Therefore, tokens with different functions, such as utility and security, might end up being assessed under the same metrics, eventually leading to over-compensation or under-compensation of investors. It is expected that with increased regulation of crypto-assets, classification frameworks would be in place to effectively define the major functional differences in these assets. It would therefore be imperative that a common ‘standard’ for classification of crypto-assets be developed that would aid dispute resolution processes. The classification

challenge also has major implications for the critical function of determining an appropriate valuation approach, which is dealt with in the next section.

6.2 The 'Valuation-Approach' Challenge

The suitability of traditional valuation approaches for crypto-assets has been debated for some time (Bheemiah and Collomb 2018, 12–31). Although financial experts have attempted to retro-fit traditional approaches for the current token market, they have been accompanied by several challenges. First, the nascent state of the current crypto-asset market has made it difficult to test the retrofitted valuation models. Although the number of token transactions has risen exponentially in the past two years, robust empirical evidence for these valuation models is not yet available. Second, the classification challenge as discussed earlier, presents significant problems in valuation due to the sheer diversity of tokens in circulation. Traditional models that were designed to value uniform asset classes like equity stocks are unable to satisfactorily accommodate the distinct utility and ownership rights granted by different types of tokens. Third, most crypto-investment vehicles like ICOs do not provide enough transparency for a fair assessment of an enterprise to be done, unlike traditional funding routes that have well-established standards and pre-requisites.

From a damages assessment perspective, finding an appropriate valuation approach that fulfils the full-reparation principle is a critical task. Arbitrators are often presented with a number of financial models by disputing parties from which they choose the most appropriate approach. Tribunals are given plenty of discretion in this task, although any decision must be well-reasoned and suited to the facts at hand. However, tribunals are likely to be faced with the same conundrum that financial experts face when assessing crypto-assets. Considering the full-reparation principle, the tribunal would need to construct a hypothetical scenario where the foreign crypto-investor was not harmed by an unlawful State act. In this context, the tribunal would then need to determine an appropriate valuation date considering the types and effects of State actions in issue, subsequent events etc. and are therefore largely determined by the facts of a case. With respect to the crypto-asset market, three important considerations for an arbitral tribunal are as follows:

- Due to the absence of substantive information about specific ICOs and the market in general, token prices end up becoming a product of speculation. Any assessment based largely on token pricing information, would therefore lead

to speculative damages that violate the principles of compensation for damages, such as those under the ILC Articles on State Responsibility.

- Speculation is also a critical factor behind the high price-volatility in the crypto-asset market (Financial Stability Board 2018). Further, crypto-trade is unrestricted by national borders, with investor funds rapidly circulating around the world via online exchanges. This means that isolating the impact of a host State's unlawful act from multiple global factors affecting crypto-asset prices will be an extremely complicated task. Further, the existence of the crypto-asset market as a common digital market suggests that increased national-level regulation will continue to affect prices for the years to come.
- The three traditional types of approaches to valuation – market, income and cost – rely on metrics that may not be transposing well into the crypto-asset market. In recent years, several financial experts, cryptocurrency researchers, investment funds and companies have focused on the shortcomings of these valuation approaches and have proposed alternative valuation frameworks that are built around the operational framework of crypto-assets (Burniske 2017; Johnson, Bufton and Daniel 2019; Lannquist 2018). This is indicated in the Table below (see Table 2).

Crypto-asset valuation techniques and strategies are evolving rapidly. The type of tokens in question can be the principal factor behind the choice of a valuation approach, and the said approach can only function well when its metrics are adapted to the token ecosystem. Criticism against application of traditional valuation techniques has largely been about the failure to take into consideration the specific variables involved in assessing any kind of crypto-asset. From a dispute settlement perspective, it presents significant responsibilities for an arbitral tribunal to ensure that the crypto-assets in question are valued based on their underlying nature and function, and not as a simplified class of assets as a whole. Particular attention should be accorded when assessing token types such as security and utility tokens whose value may be driven by distinct factors. When assessing the extent of harm caused by State actions on a wide array of crypto-assets, these distinctions may heavily influence the quantum of damages that are determined.

6.3 Valuation Frameworks and the Arbitral Process

The issues in valuation that have been discussed until now will certainly have a bearing on damages assessment tasks undertaken by an arbitral tribunal. As the

Table 2: Valuation Approaches and Their Applicability to Crypto-Assets.

Valuation approach	Principal considerations	Comments
Market/Comparables based	<p>While market-based metrics such as multipliers can be useful for comparing tokens with each other, most common metrics cannot be implemented for cryptocurrencies and tokens. It has been suggested that traditional financial ratios and multiples such as P/E, EV/EBITDA etc. can be modified for crypto-assets with token relevant metrics like Network Value to Transaction (NVT) ratio, where $NVT = \text{Network value of token} / \text{Transaction volume in the network}$.</p> <p>Major limitations include the risk of incorrect valuations due to the fairly short time-span of existence of most token types, isolating effects arising from speculation over prices of certain tokens over others etc.</p>	<p>Comparing token prices, market activity and other indicators may be implemented with the necessary modifications to determine fair value of the tokens in question. However, arbitrators would need to keep in consideration the infancy of the current market and the inclination towards speculation among participants.</p>
Income based	<p>Approaches like Discounted Cash Flow (DCF) may be only suited to specific types of tokens such as security tokens that create expectations of profits dividends, revenue share, price appreciation etc.</p> <p>Most non-security tokens don't generate any cash flows and income-based approaches are not suitable.</p>	<p>Income-based approaches to value crypto-assets would be suited to those particular assets that have an established history of cash flows that can reliably project into the future. It may not be possible to do so in cases where tokens have been issued fairly recently.</p>
Cost based	<p>Cost of mining/ production of a unit of a token have been discussed as a possible metric for valuation. Factors include electricity, machinery involved etc.</p> <p>Cost based approaches are primarily suited for utility tokens than other types as they have low liquidity and network-specific functionalities.</p> <p>Cost based approaches are conditioned on the availability of adequate market information. They are not suited to more dynamic tokens with higher trading volume.</p>	<p>Cost-based approaches will not be able to account for factors like lost profits and would therefore have to be supplemented by additional valuation strategies to determine the full amount of damages.</p>

crypto-asset market evolves over the years and with greater formalisation, it is expected that these issues will largely be resolved through standardisation of valuation processes for crypto-assets. However, dispute settlement processes will certainly have their task cut out while navigating through this period of adolescence. One of the critical questions in this regard is whether such dispute settlement mechanisms are able to effectively handle damages claims at the present state. Given the general reluctance of investment arbitral tribunals to consider damages claims of the more speculative kind, it might presently prove to be difficult for investors to receive satisfactory damages awards on their claims (Simmons 2012). Damages experts appointed by parties or tribunals will play an important role in providing the most coherent explanations for token valuations and in reducing avenues for speculation to enter into such calculations. While certain assumptions will be unavoidable in constructing a 'but-for' scenario for the injured investment, it would be imperative to keep in check that valuations are controlled for price volatility and isolate the impact of the relevant host State action from external factors.

7 Conclusions

For arbitral tribunals, the principal challenges to valuation of crypto-assets lie in devising a classification mechanism for the diverse networks of tokens in existence and in selecting an approach that can effectively assess damages. This lack of a legal framework for crypto-assets in most countries combined with the nascent state of the market and related research makes this task difficult to fulfil. Reliance on market pricing information by itself is unlikely to provide an actual estimate of valuation of tokens as they continue to be driven to a large extent by speculation. Additionally, crypto-assets are not a single homogenous group but comprise of a variety of tokens that are designed to perform different functions and can have multiple 'identities' as assets. Therefore, arbitral tribunals need to have a very careful approach to valuation that is driven by methods designed around the crypto-ecosystem. In order to fulfil the international legal standard of full reparation, tribunals have to ensure that they do not construct a hypothetical situation of an investor that may lead to over-compensation or under-compensation of the investor. In any valuation exercise, tribunals should therefore put great emphasis on understanding the specific kinds of crypto-assets in dispute and devise valuation approaches that adopted for distinct token types. The role of experts is important in this regard, in order to draw reliable estimates of value based on factually verifiable metrics for valuing crypto-assets.

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