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Tokenising Trade Finance, Public Procurement and Employee Compensation

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Abstract

The token economy is taking shape and has the ability to totally transform the financial and banking sectors. However, tokens are not new and can be traced back more than a century. This paper identifies what tokens are emerging, the technology that supports them, and the international transactions costs they derive when compare with conventional banks. The paper compares the current day licensing framework of Australia, European Union, United Kingdom and the United States. It demonstrates how the current licensing frameworks for these jurisdictions is far from being settled, and is going through a significant shift politically and governments embrace tokens. If fully realized, tokens will transform the existing way in which payments, settlements and clearing is undertaken. Tokenization of the financial sector alone offers the potential opportunity for significant gains in reducing transactions costs and time. However, as with anything undertaken over the Internet, there are risks associated with cybersecurity. The paper further demonstrates that the estimated contribution token will provide the overall international economy for tokenizing trade finance, public procurement and employment compensation, will be significant. It is expected to add an enormous amount of wealth to nation states. Yet, the paper concludes that there is more work required, and urgent research is needed to fully understand the economic impact of tokens.

Keywords

Tokens, Licensing, Australia, European Union, United Kingdom, United States

1. Introduction

Tokens are being developed as a key component of the new digital economy. In the middle and late '1960's the token economy emerged as a promising intervention in the treatment, rehabilitation and education of psychiatric patients'. [1] On the one hand, tokens and their ensuing systems 'have been used for centuries and have evolved notably to systems used today. Clay coins, which people could earn and exchange for goods and services, in the early agricultural societies were part of the transition from simple barter systems to more complex economies'. [2] On the other hand, Christopher Doll and others highlight how before the clay coins period, 'incentive based and reinforcement structures were created and sustained in a variety of cultures and as part of many institutions within those cultures. Governments used the influencing abilities of rewards to shape behaviors in battle and throughout society'. They have been used successfully to change and manage student behavior for decades across the education sector.

Most noteworthy, Christopher Doll *etal* go onto say that 'within a token economy, tokens are most often a neutral stimulus in the form of "points" or tangible items that are awarded to economy participants for target behaviors. In a token-reinforcement system, the neutral token is repeatedly presented alongside or immediately before the reinforcing stimulus. That stimulus may be a variation of edibles, privileges, or other incentives'. These incentive based tokens have been used effectively to ensure that individuals comply with norms and principles expected of them within a given society.

In more modern times tokens have been developed to provide what could be argued is a product. That is, are evolving and can be found everywhere across society. Arguably, in most countries' tokens can be found in the form of a tangible product that included, but not limited to 'gaming-style chips, tickets, coins, fake money, marbles, stickers or stamps'. At the time of writing this paper, the national election in the United States had concluded and the Republican Party were to assume the White House in January 2025. The election result could be a pivotal time in the history of the token economy (crypto) [3], where it has become a central policy to championing innovation. Countries around the world have been investigating how to grapple with this new economic activity, and what the impact will be to the national sovereign. This paper will draw on a selected number of economies such as Australia, European Union, United Kingdom and United States to confirm how the respected policy and legal frameworks will provide for the development and use of tokens. It will further broadly explore the application of tokens for trade finance, government procurement, and jobs (including seasonal workers).

Centrally though, tokens are 'designed to enable multi-asset, multi-function and multi-party financial transactions and services, that could record both money and other assets'. [4] It is the multi, asset, function and party that, 'differentiates it from existing payment, clearing and settlement arrangements, which typically hold money on separate ledgers'. By their functionality, features of the 'digital token may facilitate the coexistence of different asset types on a single programmable platform. Tokenized assets can then be traded and settled using applications built on the platform'. The resulting effect is that these applications may allow for bundling different functions and creating new ones. An application could combine pre- and post-trade services – financial market functions that are typically separated in existing arrangements. Token arrangements may also employ automation and conditionality of transactions across a range of functions and/or asset types, potentially affecting the execution of financial market functions if allowed by legal and regulatory frameworks. Overall, this could expand the set of operationally feasible options for carrying out financial transactions. Therefore, the challenges to the current regulatory framework will be significant, and are far from settled. Yet, the authors in writing this paper are not advocating for a complex regulatory regime to be established. Rather, it is argued that regulation

must be balanced with the ability for innovation so as nation states such as those economies compared in this paper can seize the opportunities from this new activity.

Viewed this way, the automation of transactions helps speed up the transaction and thus in turn lowering the transaction cost. It is these lower transactions costs that will be attractive to the business community. Therefore, what the world could possibly see over the next decade is the tokenization not only of money, but also assets such as the family care, boat, realestate, computer-laptop, amongst others.

Notwithstanding the above, Ali Sunyaev notes how the advent of current-day technology has changed the token economy. [5] Recent developments have seen tokens being facilitated over a distributed ledger (DTL). The DTL helps facilitate the transactions of tokens between individuals and entities. However, the token economy 'depends on the widespread acceptance and use of interoperable DLT protocols as interaction standard in order to benefit from positive network effects in inter-organizational networks and to avoid challenges that can occur when different DLT protocols compete in the same industry or market'. Arguably, the DLT's come in different forms [6], and blockchain has emerged as one of the front-runners in this technology, providing a platform whereby cross-border digital transactions can be undertaken. The benefits of the DLT and blockchain cannot be underestimated, and have been reported as being able to provide 'efficiency gains driven by automation, transparency; improved liquidity (adding liquidity to currently illiquid assets), faster and potentially more efficient clearing and settlement'. [7] Should this be fully realised, it will significantly disrupt not only the financial sector, but, also broader areas of the economy such as financial trading and government procurement that rely of payments systems.

Therefore, the modern economy will experience a significant transformation that, from the use of tokens will re-value trade and services assets nationally and internationally. Already tokens have and are being used for commodities such as agricultural products, along with real-estate (tracking title), and tracking shipping containers. Thus, there can be a token for hard and soft assets. This means, for example, that title fraud of real-estate is likely to be more secure. At issue is the current national legal and policy frameworks, particularly in the area of cross border use of tokens is generally undefined. The regulation if this activity and token products is largely in their infancy and states are grappling with what a regulatory framework should look like.

Nonetheless, what has emerged is broadly four types of tokens that include:

1. *Fungible Token* - that is capable of mutual substitution among individual units;
2. *Non-Fungible Token (NFT)* - that is not capable of mutual substitution among individual units;
3. *Security Token* – that has specific characteristics that meets the definition of financial instrument or other investment instrument under applicable legislation in the

relevant jurisdiction; and

4. *Utility Token* - that can be used by its owner to receive access to goods or services. [8]

Against the backdrop of the above, Paritosh Basu takes argues that 'tokenization is generally constitutes two types that includes frontend and backend. Frontend tokenization takes place when a service provider creates the taken of any sensitive information even before commencing service delivery through any internet based digital platform. Whereas backend tokenization takes place when the token is created by any system only in the event there is a need for sharing any sensitive information'. [9] Based on this, two levels of tokens have emerged. First, is the high level as described above. Second, is a lower level that has resulted in tokens being developed for specific industry sectors such as primary industries. For instance, by adopting a DLT and blockchain technology agricultural supply chains could have an improved level of transparency and traceability. [10] For example, the introduction of the crypto token/s are providing digital currency for agricultural products and services. [11] It is this sector and many other trade and investment areas of the economy that rely on trade finance or are subject to government procurement. The ensuring question is whether a token would be viable for these areas of the economy. The next section will discuss what constitutes trade finance. Trade finance in not new, and has been integral to international trade for many decades.

2. Trade Finance

Trade finance has become an integral part of the legal framework that provides a high-level of certainty and continuity, particularly in cross border trade. Anne-Gaël Vaubourg in referring to Marc Aubion noted that more than a decade ago that 90% of international trade relies on a level of trade finance. [12] The accentuating question is what economic impact blockchain technology might have to this are of the economy. In 2017, it had been put forward that blockchain technologies might 'generate an annual business value of over $175 billion by 2025 and rise to over $3trillion by 2030'. [13] Should this be fully realized the outcome for trade finance could be significant. What we do know is that smart contracts and other agreements used across the technology sector can be developed and used over a blockchain. Therefore, the legal and other instruments that are used frequently in and for trade finance could conceivably be used over a blockchain.

More than 3 years ago in 2021, the idea that blockchain could be an effective addition for trade finance was acknowledged as being able to streamline trade finance progress. However, the issue, to date, is that 'migrating existing trade finance systems to newer technology architectures constitutes business process reengineering whether or not it involves blockchain'. The cautionary tale from this transition is how it is has been identified that the 'failure rate for business process reengineering efforts to be from 50% to 70%, and later studies have repeatedly validated that estimate'. This is whether the transition is undertaken or otherwise over a blockchain. Based on this estimate of failure, it has not been fully tested as to whether a token could replace the instruments used for trade finance. Nonetheless, Vaubourg further argues that the 'first form of trade finance is called trade credit. This corresponds to credit one firm grants another through the form of a letter of credit. [14] The letter of credit constitutes:

The terms of the sales contract often require the importer to ask its "issuing bank" to issue a letter of credit guaranteeing payment for the imports upon certification that the exporter has met the terms of the con- tract. [...] using the letter of credit as collateral, the exporter will often obtain a working capital loan from its bank (often called the advising bank) to cover the production costs of the goods. The third step in the process involves the transfer of the goods to the carrier and the title of the goods to importers' issuing bank. Assuming all documents are in order, the issuing bank will issue a "bankers' acceptance" to the exporter guaranteeing payment at a future time, often around 90 days after the goods arrive."

The underlying operation and application of the letter of credit is that it addresses a gap in working capital, which in turn resolves any enforcement issues related to the exporter' and importer's banks transaction transfer. In addition to the letter of credit, the other instruments that relate to trade finance include forfaiting, factoring, export finance and trade credit insurance. [15] On the one hand, forfaiting is a trade finance technique that allows exporters to obtain cash by selling their medium and long-term foreign accounts receivable at a discount to a forfaiter. On the other hand, factoring is when an exporter sells an invoice to a trade financier at a discount, the financier then becomes known as the 'factor'. That is, having acquired the invoice – i.e. the right to the goods – at a discount, the factor is then able to sell the goods to an importer at full price, thus making a profit on the sale. In addition to the above, export finance, also known as export credit, is a trade finance technique favoured by small and medium-sized enterprises, as it is often issued through government agencies, although can also be accessed through banks and lenders. Generally, most major economies have their own export credit agency, such as the United Kingdom Export Finance, the United States Export-Import Bank, and the Australia's Export Credit Agency. More specifically these entities are either part of government or backed by the respective national governments.

Essentially, they provide a level of capital to exporters, which in turn allow them to reach higher risk markets, with cash they otherwise might not have access to. A salutary observation is that, trade credit insurance provides a level of protection against risk of non-payment. Yet, operationally they allow a party 'before entering a trade transaction, an exporter can purchase trade credit insurance from an insurance broker or directly from an insurance underwriter, who will price the insurance policy based on the perceived risk of

the transaction. Most noteworthy, drawing credit from an insurer allows an exporter the comfort to ship goods in lieu of payment from the buyer'. These instruments have been effective tools in cross border trading activities for decades.

In addition to the above, other instruments that also forms part of the overall tool box in trade finance is Bills of Exchange, Documentary Collections or Receivables financing, Invoice Discounting, Trade Crediting and Political Risk Assurance, Supply Chain Financing [16] and Bank Guarantee [17]. The question arises as to whether these instruments have now been fully automated by technology?

Centrally, it is argued that tokens can be applied to trade finance and the relevant instruments that support this activity and function. This because similar to a smart contract, these instruments can be placed or develop over a distributed ledger. However, cross border application of these instruments and other payments through the use and application of tokens remains challenging. This is because the regulatory frameworks are far from being settled.

Cross border transactions while well-established involve different regulatory regimes, and can be costly. However, the framework for cross border payments, transactions and transfers for tokens remains work in progress. For instance, an entity that uses a distributed ledger such as blockchain to make and receive cross-border payments may not want to hold token assets on their balance sheets. [18] Chris Harmse argues that establishing the perfect customer experiences and maintaining regulatory compliance are two crucial aspects that must be invested in, and can quickly expend significant resources. There are a number of different frameworks available that provide for the application of tokens such as Ripple XRP, Token Less Blockchain, Corda Settle and SWIFT [The Society for Worldwide Interbank Financial Telecommunications]. [19] These systems have been very effective and SWIFT has been established since the 1970s. The other systems are relative young.

Apart from the above, what has emerged as a possible way forward is the use of smart contracts for cross border transactions. In 2024, Arya, Singh, Gupta and Dwivedi have adopted the position that smart contract can be used. The authors put forward that:

Imagine vending machine, but instead of coins, we use smart contract. To put in your money, select your item, and machine automatically dispenses to you. No need for the human to check your money or give you your item. That's how basically smart contracts work. They are self-executing agreements that are stored on the blockchain network, which is like a super secure and transparent database. Once smart contract is created, it cannot be changed, so everyone involved can be sure that the terms of the agreement will be followed. Smart contracts can be used for all sorts of things, from buying and selling goods to renting property to managing supply chains. They can even be used to create new forms of organization, such as decentralized autonomous organizations. [20]

In reconciling the above, the smart contact can be applied to the protocols and the DOA [decentralized autonomous organizations]. Applying a DOA can be multi-functional and as this paper highlights it has been put forward for tokens to be applied to public procurement. The authors go further and argue that the benefits of smart contracts include:

Increased efficiency: Smart contracts can automate many tasks that are currently done by humans, such as the verifying payments and processing paperwork. This can save time and money. Reduced risk of fraud: It is immutable and tamper-proof, so they can help to reduce the risk of fraud. Improved transparency: it stored a blockchain network, which is public ledger. This means that everyone can see the terms of contract and track its execution. Smart contracts are the powerful tool that has potential to revolutionize many industries. As blockchain technology continues to develop, we expect even more innovative and creative uses for smart contracts in the coming years.

From the above, the authors were able to conclude that the research demonstrates the potential for blockchain technology to transform cross-border payments by reducing transaction fees and settlement times. Our prototype leverages stablecoins, smart contracts, oracles, and liquidity pools to deliver efficient tokenized fund transfers between parties internationally. Further enhancements around compliance, security, and scalability are needed before mainstream adoption can occur. The solutions explored show the promise of decentralized financial infrastructure to enable accessible, affordable remittances globally.

However, based on the above, it is noted that there are areas that have significant gaps that need to be addressed. This has been reaffirmed by the authors who undertook this study, who identify the key areas for further exploration includes integrating compliance mechanisms, robust security testing, scaling for higher transaction volumes, modelling liquidity risk across currencies, expanding fiat on/off ramps through bank partnerships, and optimizing user-centric design focused on financial inclusion. Diligent engineering and collaborative alignment among stakeholders can drive blockchain adoption to underpin the next generation of interconnected global finance.

Arguably, the use of a smart contract could be a highly viable option to apply token transactions for cross-border transactions. It is argued that the areas of trade finance, public procurement and employment compensation all utilize traditional paper agreements and contracts that can be automated in the same way as smart contracts over a distributed ledger. This could be in the form of a private, public or consortium blockchain-distributed ledger. This will be a commercial decision for the organization establishing such a cross border payments system.

3. Public Procurement

Applying and adopting a distributed ledger for government

will streamline procurement processes and systems. This is because these are generally processes driven through current software programs, and to some extent has and can be automated. Tenders that are the mechanism of choice for government procurement, fall within a form of contract and agreement. Based on this proposition, tenders can be developed and governed over a distributed ledger in the same way as smart contracts. A benefit to adopting a distributed ledger to government procurement was identified by Félix Monteiro, Miguel Correia to 'supporting properties such as decentralization and automation.

Notwithstanding the above, these qualities allowed the creation of Decentralized Autonomous Organizations (DAOs) which constitute collectively owned and managed organizations that use a blockchain system. The essence of a DAO is not only its code but also its community. It requires quorum approval to execute tasks or take democratic decisions. Therefore, DOAs do not have a central point of authority, such as a CEO, who might abuse their decision-making power'. [21] The resulting effect is that by decentralizing power could minimize influence and corruption. If fully realized this will offer governments that take corruption seriously with a further layer of security and certainty for future public procurement.

Viewed this way, the authors highlight how that traditional process for and of public procurement commences with the 'public organisation publishing a call with a list of responsibilities and procedures that the private entities must follow. This document presents the rules and bylaws of the contest, explaining how applicants can submit their proposals, the contest deadlines and the service requirements'. [22] While out of scope of this paper to compare and examine in detail, the general rules and clauses of tenders from an organization would not diverge significantly.

Depending on the procurement topic will determine how and whether clauses need to be tailored to suit. Thus, it is argued that they can be automated in the same way as smart contracts. However, the rules set by organizations 'may not be fair to all the applicants, and thanks to the applied centralized solution, they have no voice in the matter'. The authors argue that by adopting the DOA framework, similar to DApps [decentralized applications], the 'creation of a DAO can be based on smart contracts that have been deployed on the blockchain (a form or distributed ledger).

When the DAO is created and deployed, a poll is the only way to alter its regulations. After its launch, some DAOs can start collecting or distributing funds for the purpose for which it was created'. The resulting effect is that these funds come in the form of tokens'. This process can be instituted over a distributed ledger that can be owned, and the individuals or entities that engage in the DAO obtain rights such as 'voting in decision polls, providing feedback, or even setting future ideas for the organisation'. It is also possible to distribute non-transferable tokens based on a member's reputation in the DAO. Reputation can be earned and lost based on the consequences of a member's actions. Monterio and Correia further note that:

> The decision-making process is one of the core features that separates a DAO from standard organizations. Decisions are recorded on-chain and executed automatically. Once a proposal pool obtains a successful decision, that decision is executed without human interference, providing a secure and democratic interaction to end users. Due to the innovation that smart contracts introduced to blockchain technology, it is possible to assemble DAOs to achieve multiple business goals. Protocol DAOs provide decentralized financial services (DeFi); an example is Uniswap, which supports the trading of tokens. Social DAOs focus on supporting people's interaction; an example is the FWB DAO.

Most notably, the authors stated that in 2023, there are no current proposals for DAOs for public procurement services. This alone, provides an opportunity for entities to further explore and undertake research. More specifically, and while in the context of this paper, applying the DOA to trade finance, public procurement and jobs and employment may not fit together, additional research is required. Nonetheless, Monterio and Correia note in a case study of the DOA governance comprises two contracts. First the TimeLock and second is the GovernanceProtocol, which include the:

> TimeLock contract that uses the module TimeLockController. When set as the owner of an Ownable smart contract, the TimeLock contract enforces a timelock on all onlyOwner operations. A timelock is a mechanism that delays calls to another smart contract until a predetermined time has passed. This makes TimeLock the only executor of operations in this system and provides the community with time to process the result of an operation before its next stage. The TimeLock contract has three important system roles: Pro- poser, Executor and Admin. The admin role is automatically assigned to the deployer, allowing him to assign roles. The Proposer role is given to the GovernanceProtocol, making it in charge of proposing operations and the only entity allowed to schedule and cancel operations. The Executor role is given to everyone, meaning anyone can execute the operations previously scheduled by the Proposer. After deployment, the Admin role is renounced in favour of administration through time-locked proposals. Without administrators, it is impossible to change roles later, making this system fully au- tonomous. This relationship between the GovernanceProtocol and the Time-Lock contracts makes this project a decentralised and autonomous system. The GovernanceProtocol contains all the functionality logic connected to the user interface, making it the direct point of inter- action for the system users. Through the GovernanceProtocol contract, users can submit all available operations that the TimeLock schedules. These include propose, vote, queue, and execute proposals.

Operationally, Monterio and Correi state that the system has role verification for voters, the governance protocol identifies voters, not by their role, but by checking if they hold

a certain token: the Governance Token (GT) is a standard ERC20 token modified to apply on-chain voting. ERC20 is a standard for fungible tokens, i.e., for tokens that are identical and all have the same value. In this design, a board member must have at least one GT token to vote. However, the token balance of each board member does not account for voting power, making to- ken transfers cheaper. Only board members can mint and delegate tokens to themselves since they are the only voting authorities in the DAO.

The authors further highlight how once the proposal is submitted and before its voting period begins, the system enforces a configurable voting delay, allowing board members to prepare for the next stage and mint last-minute governance tokens if necessary. After this delay, the voting power is fixed, and the voting period starts. If a board member's account already owns GT tokens, it is not required to mint again for the next vote. During the voting period, each board member can submit one vote by providing the respective proposal ID, a voting option, and a vote description that justifies the reason for the voting option. The voting options can be "For", "Against", or "Abstain". Governance Tokens are not spent per vote, so one token is enough to prove to the governance protocol that a board member can have one vote in multiple proposals. Consequently, if a board member submits a vote without holding a governance token, that vote is not considered. When the voting period ends, the majority wins, meaning that even if a board member with 20 GT votes in favour and two board members with 1 GT each vote against, the result of the proposal is unsuccessful. After the voting period, the proposal is ready for queueing. The queue period is set according to the minimum delay time set by the timelock. It is employed so that the DAO's community can prepare for future changes in the upcoming execution. The queue and execute functions require passing all proposal parameters, instead of just the proposal ID, because this data is not stored on-chain, as a measure to save gas. However, these parameters can be found in the events emitted by the contract. The only parameter not sent in full is the proposal's description since it is only needed in its hashed form to compute the proposal ID. After the minimum delay time, the proposal can proceed to execution. From the user's point of view, executing a proposal is the same as queuing it. In a successful proposal, the proposed function is executed with the parameters provided. [Where] The system presents the error: *Proposal not successful* in a failed proposal. this function is important as it allows for clear determination of where there has been a system error by the person applying for the procurement.

Based on the above, tokenization for and of the public procurement process can be achieved, with affect and further research to ensure the protocols supporting the distributed ledger will achieve the desired outcome. That is, total tokenization of procurement. Significant too is how the first step in the launch of a DApp is the deployment of its smart contracts. The deployment of a smart contract consists of a transaction containing the compiled code of the smart contract

without specifying any recipient. The completion time of an Ethereum transaction depends on how much gas is paid (i.e., transaction fees) and how congested the *nd* Ethereum network is. This system was deployed on 22 November 2022 in the Goerlitestnet. Therefore, we must take into account the standard network values on that day, such as the average Ethereum transaction fee of 0.000464Eth and the standard gas price of 1.935. 10-9 ETH.

Noteworthy too, is that the 'time it takes for an Ethereum transaction to complete depends on how much gas is paid and how congested the Ethereum network is. Paying the price takes an estimated 15 seconds for the transaction to be completed. Another example provided by the study noted that depending on the [smart] contract used such as, AdministrativeAccessControl has a transaction cost of 0.03574, and the GovernanceToken applies a 0.04706. More specifically, what is not clear from this study is whether these transaction fees are transaction or only national, or both. This needs to be reconciled. In conclusion this study was developed in Solidity and JavaScript, deployed in the Goerli testnet, and follows the same workflow of standard public procurement contests. By introducing decentralization, security, and transparency attributes, this study demonstrates a solid solution that deprecates trusted third parties in public procurement contests and exhibits a new application of DAOs in today's society'. It can be argued that tokenization of public procurement will establish multiple efficiencies for the governance of the process, the development of the tender, contract formation and relations, and payments. It could also extend to allow vendors to directly interact with government and bid for offers. It will provide a greater level of transparency. The next section explores the use of token payments for employment compensation.

4. Employment Compensation

In 2022 Bharti Pandya Priya Rao undertook research to better understand the viability or otherwise of the use of tokens to compensate employees and contractors. The authors note how compensation in the human resources discipline, is defined as the monetary and non-monetary payments made to an employee in exchange for job performance. In simple terms, compensation includes salaries, allowances, benefits, performance-based rewards, and provisions for adequate working conditions. Dwelling on compensating employees in and by a token (crypto), noted that companies are finding ways to introduce blockchain, or, encrypted currencies, such as crypto, in their compensation plans. [23]

Viewed this way, and while still exploratory, the early indications are that tokens could be used to compensate individuals and entities for work performed, in the same way as payments are made for hard assets or products. Essentially employment is a service whereby an individual, or, an entity is compensated for performed. Pandya and Rao go further stating that for crypto [tokens] to sustain, employers need to

follow the taxation regulations, labour laws, minimum payment standards, and foreign exchange regulations of the country from where crypto payment is initiated. From employees' perspective, it is important to understand the nation's regulations related to taxation of capital gains and foreign-exchange laws. Otherwise, the benefits from crypto would be diluted by the legal penalties. Further, if either party wants to reap the benefits from crypto compensation, they must understand the requirement of having a strong technological infrastructure and know-how.

Thus, for payment to employees that are undertaking restricted visa seasonal employment in a foreign country, token payments are yet to fully accommodate foreign exchange and tax regulation, amongst others. The adoption of tokens for employment compensation could be more secure, efficient and critically, when transferring such payments across international border, the transactions costs should be less than a traditional bank transfer.

On the backdrop of the above, such a framework had been deployed by DAOs, token compensation has its roots in giving contributors the ability to participate in the direction of a project and align their personal goals with an organization's success. On top of these fundamental principles, confidence in the project or protocol being built translates to the belief that the native token will eventually appreciate in value, thus representing a meaningful financial incentive for contributors. [24]

Thus, the DOA framework has emerged as being highly supportive to supporting tokens for compensation payments and rewards. In addition, and while the DAOs use token compensation as the main means of paying contributors, other crypto companies use it as a form of issuing bonuses or rewards in lieu of equity. This can be an innovative way of giving employees ownership in a project or a substantial benefit while avoiding high taxation. In the case of restricted token awards, because they are granted before the token is officially released, for tax purposes, recipients in the US can file a form acknowledging token receipt pre-release and will thus pay significantly lower taxes.

Nonetheless, cross border transnational payments would need to also be tied to the national regulator, if and where they exist. For example, in Australia Austrac [25], monitors all international transfers above AUD$10,000.00 To reinforce the viability of a token used for employment compensation, the Australian Taxation Office (ATO) in 2019 published their 'current view of the income tax implications of common transactions involving tokens-cryptocurrency', which included a section on paying salary or wages. [26] Craig Cameron in 2020 advocated for the use of tokens for employment compensation stating that:

Employers may issue and distribute their own token as remuneration, or purchase cryptocurrency on a secondary market, such as a digital currency exchange, and subsequently distribute the tokens to employees. For the purpose of this article, remuneration is the reward paid or provided by the employer in return for work done by the employee, and includes three components: a wage or salary, being a rate of pay to the employee in relation to work performed irrespective of how it is expressed (hourly, daily, weekly, monthly, yearly, as a commission, piece-rate or lump sum), and includes leave, loadings, allowances, payment for public holidays, incentive-based payments and bonuses; monetary benefits paid by employers to third parties (for example, superannuation); and non-monetary benefits such as child care, laptop and motor vehicle. [27]

Viewed this way, applying a token to this area could be very effective. It could assist with compensation for employees that are on working visas. For instance, it is well understood that payroll has been an essential feature of employee compensation, where are person is paid for a job they undertake. The traditional 'payroll systems, while effective, often suffer from high administrative costs, delays, and security risks. While managing payrolls for a global workforce has become quite common lace, it further presents other complexities, including currency exchange, cross-border payments, and compliance with varying regulations'. [28] Tokenization of payroll itself offers many advantages to organizations. By furthering this proposal to all employee compensation programs, offers organizations with a much more streamlined approach to internal systems and processes. It could also ensure that the compensation obtain, could be easily transferred and protected, as the employer would have reduced transactions costs to send all or part of the compensation back to the country of origin. That said, cross border national and international transactions will incur fees.

Using Australia's Banks as an example, the table below outlines the level of international transactions costs as at 2024. [29]

Table 1. International Transaction Fees as at November 2024.

Bank	Sending fees (online payments)	Receiving fees
NAB	Up to $35	Up to $30
ANZ	Up to $9	Up to $15
Commonwealth Bank	$0-$30	Up to $11
Westpac	$0–$32	$0-$12

Bank	Sending fees (online payments)	Receiving fees
Macquarie Bank	Up to $15	$0 (overseas bank charges may apply)
BOQ	$20	$10
Bendigo Bank	Up to $30	$2–$10
HSBC	$0-$20	$10
Suncorp	$0-$30	$0 (overseas bank charges may apply)
St. George Bank	$0–$20	Up to $12
Bankwest	$15-$35	$10

In applying the above, the transfer fee applies at both the sending and receiving stage. Thus, for a transfer made through ANZ Bank, the total transfer cost could be up to AUD$60.00 depending on the jurisdiction involved, and applying the above from Australia, transnational transfers incur fees of about 3%-4%, and a Bank may add up to 7% [30] for the exchange rate. Thus, an AUD $10,000 transfer could cost up to AUD $1,100.00. This cost is only for the sending party, and the receiving party may incur similar. However, the international fees - transactions costs associate with tokens is far from settled, and can vary depending on the provider.

For instance, according to the XRP Ledger [31] the transfer fee for tokens, as at November 2024, was:

is controlled by a setting on the issuer's account. The transfer fee cannot be less than 0% or more than 100% and is rounded down to the nearest 0.0000001%. The transfer fee applies to all tokens issued by the same account. If you want to have different transfer fees for different tokens, use multiple issuing addresses. The transfer fee is specified in the TransferRate field, as an integer which represents the amount you must send for the recipient to get 1 billion units of the same token. A TransferRate of 1005000000 is equivalent to a transfer fee of 0.5%. By default, the TransferRate is set to no fee. The value of TransferRate cannot be set to less than 1000000000 ("0%" fee) or more than 2000000000 (a "100%" fee). The value 0 is special case for no fee, equivalent to 1000000000. A token issuer can submit an AccountSet to change the TransferRate for all its tokens. Anyone can check an account's TransferRate with the account_info method. If the TransferRate is omitted, then that indicates no fee.

Put another way, the current minimum transaction cost required by the network for a standard transaction is 0.00001 XRP (10 drops), however, this can increase depending on the load. [32] On the other hand, Solana [33] provide the following transaction costs that include:

1. *Fee basis points*: This is the fee assessed on every transfer. For example, if 1000 tokens with 50 basis points are transferred, it will yield 5 tokens.
2. *Maximum fee:* The cap on transfer fees. With a maximum fee of 5000 tokens, a transfer of

10,000,000,000,000 tokens will only yield 5000 tokens.
3. *Transfer fee authority:* The entity that can modify the fees.
4. *Withdraw withheld authority*: The entity that can move tokens withheld on the mint or token accounts.

To put this into context, when calculating the actual cost of transfer to traditional currency rates, it will depend on whether currency is used to underpin the payment-transaction. It will also depend on whether the token is securitized by a national currency or commodity. Nonetheless, where a single token is securitized by USD $1.00 and in applying the Solana example, a transfer of 1000 tokens will yield 5 tokens, and the total cost for this transaction would equate to $5.00. The general calculation is that when a token is sold in the local currency, and the fee is the same currency as the token sold that, the transaction itself is added to the cost basis of that currency. Therefore, and based on the above, the use of a distributed ledger will result in significant reduced transaction costs.

Further to the above, adopting the approach taken by Coinbase [34] with a trading volume of less than $10,000 incurs maker and taker fees of 0.40% and 0.60% (equates to 1%), respectively, while trade volumes of more than $10,000 decrease in tiers based on how much you trade. Thus, this calculation of 1% would incur an actual cost on a $1,000.00 transfer of token equivalent value, would incur a $10.00 transaction fee. The first four pricing tiers listed on Coinbase are:

Table 2. Coinbase Pricing by Fee Taker and Fee Maker.

Pricing Tier	Taker Fee	Maker Fee
$0 - $10K	0.60%	0.40%
$10K - $50K	0.40%	0.25%
$50K - $100K	0.25%	0.15%
$100K - $1M	0.20%	0.10%

For Permissioned DeFi-Based Payments that are undertaken over a smart contract blockchain costs per transaction range between USD $0.05 and $0.09—far less than the $6.40 estimate. [35] Notably, the transaction fees will vary depending on the systems and frameworks adopted. That is transaction fee on a smart contract will need to consider the distribution ledger is resides and the cost of having access. Yet, and it can be argued that the use of tokens will reduce business costs, particularly in cross border payments. This is another area of vigilance. This paper does not provide a complete and accurate outline of the transactions costs as they are never fully settled. That is, they fluctuate as the market moves on a daily basis.

5. Licensing Regulatory Frameworks Tokens

This section draws upon recent work undertaken by the authors examining the licensing legal frameworks of selected jurisdictions [36] such as, Australia, European Union, United Kingdom and United States, amongst others. In this section the term token also applies to crypto-currency and stablecoin. However, and note that at the time of writing this paper, the economies compared in this paper were further developing their respective licensing frameworks. This will require continued vigilance.

5.1. Australia

Digital payments are not regulated in Australia. Generally, the laws pertaining to banking and finance at the national level in Australia include the Banking Act 1959, the Payment Systems (Regulation) Act 1998, the Financial Sector Collection of Data Act 2001, Corporations Act 2001, and the Financial Sector (Shareholdings) Act 1998, which places a threshold ownership of 20 per cent in a financial sector company that does not need approval from the Treasurer. Generally, an Australian Financial Services Licence [37] or and authorised deposit-taking institution must be obtained to operate in Australia. There is no need to compare the application process that must be undertaken by an applicant.

As recently as October 2023, Australia introduced a Bill [37] which will give the Reserve Bank of Australia (RBA) powers to respond to the growing area of digital payments, including stablecoin(s). It will provide a framework for new entrants into the market. [38] There is an urgent need for reform. The proposal will allow the RBA to 'designate a payment system; impose an access regime on participants in a designated payment system; determine standards to be complied with by participants in a designated payment system; give directions to participants in designated payment systems to ensure compliance with an access regime or standard; and arbitrate disputes between participants in a designated payment system'. [39] Under the Banking Act 1959 as a provider

of a purchased payment facility (PPF provider). A PPF provider constitutes:

a) a person providing a purchased payment facility (PPF) that has been determined to be banking business under Regulation 3 of the *Banking Regulations 1966* (Regulation 3); or

b) a holder of stored value that falls within the *Payment Systems (Regulation) Act 1998* that makes payments (as mentioned in paragraph 9(1) (c) of that Act) in relation to a PPF that has been determined to be banking business under Regulation 3'. [40]

However, in Australia, digital payments are somewhat fragmented and also regulated by voluntary codes that have been established by the Australian Securities and Investment Commission. [41] These types of codes are generally national in their scope. The evolving nature of the law in this area has not yet resulted in published court decisions specific to digital payments.

5.2. European Union [EU]

Regulation of the banking and financial institutions across the EU [42], the Basil Framework provides the overall regime. [43] That is, Regulation 2023/1114 [44] states that 'crypto-assets are electronic surrogates for coins and banknotes and are likely to be used for making payments'. [45] This definition also extends to other tokens and includes:

Where a crypto-asset falls within the definition of an asset-referenced token or e-money token, Title III or IV of this Regulation should apply, irrespective of how the issuer intends to design the crypto-asset, including the mechanism for maintaining a stable value of the crypto-asset. The same applies to so-called algorithmic 'stable coins' that aim to maintain a stable value in relation to an official currency, or in relation to one or several assets, via protocols, that provide for the increase or decrease in the supply of such crypto-assets in response to changes in demand. Offerors or persons seeking admission to trading of algorithmic crypto-assets that do not aim to stabilise the value of the crypto-assets by referencing one or several assets should in any event comply with Title II of this Regulation.

To reinforce the above, a crypto-asset is 'a digital representation of a value or of a right that is able to be transferred and stored electronically using distributed ledger technology or similar technology'. This was reaffirmed in 2022, when the Court stated that 'according to the Greek legal order, bitcoin is considered a "*digital asset*" and not a currency. In essence, it is a digital unit of value that can be exchanged electronically and has no physical form'. In addition to the above, an 'electronic money token' or 'e-money token' is a type of crypto-asset that purports to maintain a stable value by referencing the value of one official currency'. Although the EU is moving towards a central bank digital currency, [46] it is also revising its legal framework to allow digital payments. The proposal is aimed to increase 'integration and provide a framework for the sin-

gle euro payments area; to promote competition and innovation by improving the level playing field for payment service providers; to increase the safety, convenience and efficiency of payment services; and to provide a high level of consumer protection'.

Apart from the above, there is a threshold for reporting certain transactions where the 'issuer infringes Article 22(1) by not reporting, for each significant asset-referenced token with an issue value that is higher than EUR 100 000 000, on a quarterly basis'. [47] The policy underpinning this reporting will be similar to that of cash transactions that are transferred transnationally. This is an area that governments and regulators should harmonise. More specifically, what this means for stablecoins is that most 'issuers will have to be incorporated in the form of a legal entity established and authorised in the EU in order to operate, and publish a crypto-asset white paper that explains what the product is and how they operate, approved by a competent authority. Similar requirements apply to issuers of EMTs within the meaning of Article 2(1) of Directive 2009/110'. [48] The developments of the EU legal framework are important to the overall legal landscape of digital payments. The EU has the opportunity, similar to that of the data laws [49] established in the 1980s, to drive and influence other countries to develop similar laws. There is no doubt that the EU is in a good position to influence the world's legal framework for digital payments through crypto-assets facilitated by blockchain technology.

5.3. United Kingdom [UK]

In 2022 and 2023 the UK is in the early stages of developing a legal framework, and have begun this process through the Financial Services and Markets Act 2000 [50] (FMA). The FAMA has been developed to provide a high level of stability across the financial markets in the UK. To begin with, funds constitute digital settlements asset. In turn digital settlements asset means a 'digital representation of value or rights, whether or not cryptographically secured that can be used for settlement of payment obligations, can be transferred, stored or traded electronically, and uses technology supporting the recording or storage of data'. [51] Furthermore, crypto assets refer to 'any cryptographically secured digital representation of value or contractual rights that can be transferred, stored or traded electronically, and that use technology supporting the recording or storage of data (which may include distributed ledger technology)'. This is a broader definition compared to the US. The US definition is more detailed and refers to digital assets rather the crypto assets. The UK does not mention stablecoin whereas, the US make a clear distinction that stablecoin forms a part of a digital asset. It is argued that stablecoin could fall within the meaning of digital settlement asset. This is because the stablecoin 'technologies rely on proof-of-work consensus mechanisms to validate transactions, which involve so-called 'miners' competing to solve complex cryptographic problems'. [51] Significant too, across the UK,

the gradual development of the above is being undertaken in phases. At the time of writing, the process had reached phase two, with the amendments to the FSMA Act. More specifically at December 2024, it is noted that section 19 of the FSMA provides that: "no person may carry on a regulated activity in the United Kingdom, or purport to do so, unless he is an authorized person or an exempt person". [52] In addition, the Financial Services and Markets Act 2000 (Regulated Activities) Order 2001 (SI 2001/544) (RAO) sets out what constitute regulated activities under FSMA. The list of investments to which regulated activities may apply is an exhaustive one, and is also set out in the RAO. Cryptocurrency, generally, is not a specified investment listed in the RAO. If cryptocurrency is not an "investment" for these purposes, activities relating to it are unlikely to constitute regulated activities and so will fall outside the general prohibition. Of importance also, is section 21 of FSMA that states "a person must not, in the course of business, communicate an invitation or inducement to engage in investment activity" unless an authorized person has signed-off or approved the content and communication. Therefore, an invitation or inducement to engage in investment activity is referred to as financial promotion. "Engaging in investment activity" involves entering or offering to enter into an agreement the making or performance of which by either party constitutes a controlled activity, or exercising any rights conferred by a controlled investment to acquire, dispose of, underwrite or convert a controlled investment. Token regulation and licensing in the UK is not settled, and further urgent work is required, if the UK wish to capitalize on this new economic activity.

5.4. United States [US]

The US legal framework for crypto-assets and digital payments is similar to that of the other jurisdictions compared. In 2022, the first Executive Order [53] was handed down that has set the policy direction for digital assets: 'advances in digital and distributed ledger technology for financial services have led to dramatic growth in markets for digital assets, with profound implications for the protection of consumers, investors, and businesses, including data privacy and security; financial stability and systemic risk; crime; national security; the ability to exercise human rights; financial inclusion and equity; and energy demand and climate change'. The Executive Order (EC), when setting the policy direction for crypto-assets, emphasises consumer protection. This, it is argued, is a common theme in US federal legislation that pertains to the digital economy. In reinforcing this point, the EC goes on to say in relation to digital assets that not only consumers, but also investors and businesses across the US must be protected. It further indicates the interconnectedness of the entire digital economy that is supported by digital assets. That is, 'the unique and varied features of digital assets can pose significant financial risks to consumers, investors, and businesses if appropriate protections are not in place. In the absence of

sufficient oversight and standards, firms providing digital asset services may provide inadequate protections for sensitive financial data, custodial and other arrangements relating to customer assets and funds, or disclosures of risks associated with investment'. Moreover, significantly, 'cybersecurity and market failures at major digital asset exchanges and trading platforms have resulted in billions of dollars in losses'. What this tells us is that the multi-layered approach of the digital economy not only has a human right and consumer protection element: it pervades the economy more broadly. That said, in laying out the foundation for defining specific terms in any new laws, the Executive Order (EO) provisions include blockchain, central bank digital currency, cryptocurrencies, digital assets and stablecoins. Thus, section 9 of the EO states:

 (a) The term "blockchain" refers to distributed ledger technologies where data is shared across a network that creates a digital ledger of verified transactions or information among network participants and the data are typically linked using cryptography to maintain the integrity of the ledger and execute other functions, including transfer of ownership or value.

 (b) The term "central bank digital currency" or "CBDC" refers to a form of digital money or monetary value, denominated in the national unit of account, that is a direct liability of the central bank.

 (c) The term "cryptocurrencies" refers to a digital asset, which may be a medium of exchange, for which generation or ownership records are supported through a distributed ledger technology that relies on cryptography, such as a blockchain.

 (d) The term "digital assets" refers to all CBDCs, regardless of the technology used, and to other representations of value, financial assets and instruments, or claims that are used to make payments or investments, or to transmit or exchange funds or the equivalent thereof, that are issued or represented in digital form through the use of distributed ledger technology. For example, digital assets include cryptocurrencies, stablecoins, and CBDCs. Regardless of the label used, a digital asset may be, among other things, a security, a commodity, a derivative, or other financial product. Digital assets may be exchanged across digital asset trading platforms, including centralised and decentralised finance platforms, or through peer-to-peer technologies.

 (e) The term "stablecoins" refers to a category of cryptocurrencies with mechanisms that are aimed at maintaining a stable value, such as by pegging the value of the coin to a specific currency, asset, or pool of assets or by algorithmically controlling supply in response to changes in demand in order to stabilise value.

Viewed this way, and most specifically, the definition of digital assets is all-encompassing. Arguably, and more importantly, it includes the technology that is used to underpin most, if not all, of the new crypto-assets such as stablecoin is blockchain. It provides a high level of legal certainty and clarity. The legal framework for tokens is evolving and far from settled. Put licensing aside, there are other challenges faced by the token sector that is in urgent need for regulatory certainty and clarity, including tax, competition, restructuring and arbitration.

In addition to the above EO, in mid 20204, the US Congress introduced the S.4912 – Bitcoin Act 2024, does not define Bitcoin. [54] The proposed Bill have been established to provide a framework for a strategic Bitcoin Reserve – to enable Government holdings of the token. Notably. The Bill, 'proposes the annual purchase of up to 200,000 Bitcoins for the next 5 years with an aim to accumulate 1 million BTC. The planned purchases are meant to minimize market disruption on transactions. Additionally, the legislation proposes that the purchases should be conducted transparently and the BTC to be held in trust for the United States'. [55] With the recent re-election of the Republican Party in November 2024, this Bill could become even more significant, as the policy acceptance of Bitcoin as a strategic reserve to and for the US, will provide a profound shift in monetary policy. It is our view that the EO provides a clear pathway forward for defining and understanding the relevant legal terms for crypto currencies, digital assets, blockchain and stablecoins. It will be interesting as to whether other economies follow the United States in their possible new monetary policy direction. Moreover, it will be of significant interest to watch how other states around the world react to any new direction taken by the United States.

6. Conclusion

The token economy is taking shape. Regulators and governments are continuing to assess their advantage economically to national economies. They potentially provide the economy with new frontiers. However, significant work lies ahead for there to be a stable and coherent token market that, would replicate the current day banking and financial system.

Tokens, in and of themselves, do not have an intrinsic value. For a token to provide a value, they are to supported and backed up by a product or service. Yet, the evolving token economy is likely to provide broader benefits to national economies, by providing a level of reserve. Tokens can also be backed. By a local national currency.

The regulatory frameworks of Australia, UK and the US for tokens are still evolving. they are far from settled. To provide certainty and stability to the market, governments, if they have cully accepted this new economic activity as being a component of the national economy, need to act sooner rather than later. Waiting for other nation states to set the rules, is likely to, result in a fragmented approach to the token economy, and for cross border transactions, may create a high level of unnecessary complexity and confusion.

This paper has highlighted three growth areas within the token economy. That is, historically and even today, trade finance, public procurement and employment compensation

all utilize traditional paper agreements and contracts. Yet, with the increasing acceptance of technology such as the distributed ledger, blockchain and smart contracts, these systems and frameworks can be now partially or fully automated. To facilitate such, the tokenization of these area could be undertaken either over a private, public or consortium blockchain-distributed ledger. Although, this is a commercial decision for the organization establishing such a cross border payments system.

On the backdrop of the above, combined these areas offer a significant contribution to national economies, if and when fully realized. However, depending on the market and sector that the token is to apply, the optimal distributed ledger technology is likely to differ. This, is an area of vigilance and as the technology continues to advance and become mainstream, it could one day become as familiar as the Iphone. Finally, further and urgent research is needed to better understand the economic benefits from tokenizing these sectors.

Abbreviations

ATO	Australian Taxation Office
CBDC	Central Bank Digital Currency
DOA	Decentralized Autonomous Organizations
DTL	Distributed Ledger
EC	Executive Order
EU	European Union
FMA	Financial Services and Markets Act 2000
GT	Governance Token
NFT	Non-Fungible Token
UK	United Kingdom
US	United States
XRP	Ripple XRP

Conflicts of Interest

The authors declare no conflicts of interest.

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