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Tokenisation of Real-World Assets: Efficiency Gains and Externalities Across the Asset Lifecycle

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Abstract

This master's dissertation explores the tokenisation of real-world assets (RWAs) as a new stage in the development of financial market infrastructure. The dissertation contributes to extant research by showing that tokenised equity structures reduce temporal access and transferability frictions, but do not necessarily improve price efficiency, legal ownership, or liquidity integration. It begins by establishing the technological and institutional foundations of tokenisation, describing how digital tokens on programmable ledgers can represent assets and rights, how various tokenisation models differ, and how the current infrastructure is being developed. Building on this foundation, the dissertation presents an analytical framework to evaluate tokenisation across the asset lifecycle—issuance, exchange, servicing, and redemption. The framework is then applied to a selected case study of NVDAon token, a digital representation of NVIDIA stock issued by the ONDO Global Markets platform. The case reveals the impact of the hybrid tokenisation model, including its benefits and concerns.

Keywords

Tokenisation, Real-world assets (RWA), Distributed ledger technology (DLT), Market efficiency, Market frictions, Asset lifecycle, Issuance, Trading, Settlement, Redemption, Smart contracts, Legal rights, Capital markets infrastructure

Abstract

Esta dissertação de mestrado explora a tokenização de ativos do mundo real (RWAs) como uma nova etapa no desenvolvimento da infraestrutura dos mercados financeiros. A dissertação contribui para a investigação existente ao demonstrar que as estruturas de ações tokenizadas reduzem as fricções relacionadas com o acesso temporal e a transferibilidade, mas não melhoram necessariamente a eficiência dos preços, a propriedade legal ou a integração da liquidez. O trabalho começa por estabelecer os fundamentos tecnológicos e institucionais da tokenização, descrevendo como os tokens digitais em registos programáveis podem representar ativos e direitos, de que forma os diferentes modelos de tokenização diferem entre si e como a infraestrutura atual está a ser desenvolvida. Com base nesta fundação, a dissertação apresenta um quadro analítico para avaliar a tokenização ao longo do ciclo de vida do ativo — abrangendo a emissão, a negociação, o serviço e o resgate. O quadro é depois aplicado a um estudo de caso selecionado do token NVDAon, uma representação digital da ação da NVIDIA emitida pela plataforma ONDO Global Markets. O caso revela o impacto do modelo híbrido de tokenização, incluindo os seus benefícios e preocupações.

Keywords

Tokenização, Ativos do mundo real (RWA), Tecnologia de registo distribuído (DLT), Eficiência de mercado, Fricções de mercado, Ciclo de vida do ativo, Emissão, Negociação, Liquidação, Resgate, Contratos inteligentes, Direitos legais, Infraestrutura dos mercados de capitais.

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Introduction

The organisation of financial markets has always depended on how ownership rights are recorded, transferred, and verified. In the paper-based system, shares and bonds were difficult to transfer and trade, especially across borders, because ownership changes required physical documents and several layers of manual confirmation (Baltais & Sondore, 2024). Digitalisation moved securities records into electronic exchanges, bank systems, clearing houses, and custodial accounts. This enabled faster trading, reduced processing time, and supported international capital flows (Mirzaye & Mohiuddin, 2025). However, digitalisation did not remove the need for reconciliation between separate institutions. Modern securities markets still depend on intermediaries that maintain parallel records for issuance, trading, settlement, servicing, and redemption. This means that the main problem is no longer the absence of digital records. The main problem is whether financial market infrastructure can reduce lifecycle frictions without creating new legal, liquidity, and operational risks.

This dissertation studies tokenisation from this perspective: that tokenisation should not be evaluated solely as a source of efficiency gains or solely as a source of externalities. It should be evaluated according to the conditions under which it is more efficient across the asset lifecycle. Tokenisation can reduce some frictions by using shared ledgers, programmable rules, and faster transfer mechanisms. At the same time, these gains may be limited or offset by legal wrappers, issuer dependence, liquidity fragmentation, restricted access, and dependence on off-chain infrastructure. Therefore, the core question of the thesis is not whether tokenisation is innovative, because this is already clear from market development. The core question is whether tokenisation actually reduces market frictions in practice, or whether it mainly transforms them into new forms.

Tokenisation refers to the representation of claims on an asset as digital tokens on a shared, programmable ledger, most commonly a blockchain (Baltais & Sondore, 2024). The key innovation is not simply that ownership records become digital. Conventional securities accounts are already digital. The relevant innovation is that several parties can interact with the same ledger and that predefined rules can be executed automatically. Agur et al. (2025) identify sharedness, programmability, and trust as the main features of tokenised systems (Agur et al., 2025). Sharedness can reduce reconciliation between fragmented databases. Programmability can automate rules such as eligibility checks, coupon payments, collateral movements, and settlement logic. Trust depends on cryptography, consensus mechanisms, and institutional governance, which together determine whether the ledger can operate as a reliable record of ownership and transfer (Agur et al., 2025). For real-world assets, however, the token is normally not the asset itself. It represents a claim connected to an off-chain legal and economic asset, such as a security, fund share, loan, commodity, or cash-flow right. This link between the token and the off-chain asset is therefore central to the analysis.

Real-world assets (RWAs) are off-chain assets with inherent economic value, including securities, real estate, physical commodities, intellectual property, and cash-flow rights, that may be represented on a digital ledger for ownership recording and transfer (Baltais & Sondore, 2024). The market has grown quickly. At the time of writing, RWA.xyz reports approximately USD 350 billion in represented asset value, where blockchain is mainly used as a record-keeping or reconciliation layer, and around USD 21.6 billion in distributed assets that are transferable and tradable on-chain (RWA.xyz, n.d.)[1]. Tokenisation has expanded across several asset classes. U.S. Treasuries and cash equivalents exceed USD 9.1 billion and are represented by institutional products such as BlackRock's BUIDL fund, Circle's USYC, Ondo's USDY, and Franklin Templeton's BENJI. Private credit follows with approximately USD 2.5 billion in tokenised loans and structured credit, including platforms such as Maple and Centrifuge. Tokenised commodities exceed USD 3.9 billion, with gold products such as Paxos Gold and Tether Gold representing the dominant part of this segment. Other areas include institutional funds, tokenised equities and private

[1] Market-size figures were retrieved from the RWA.xyz dashboard, which provides continuously updated data on tokenised real-world assets, including represented asset value, distributed asset value, asset-class composition, and selected protocol-level metrics. Because these values change over time, they are treated as point-in-time observations. Source: RWA.xyz, retrieved 21.01.2026, from https://app.rwa.xyz/

equities, real estate, and reinsurance (RWA.xyz, n.d.). This market overview shows the relevance of the topic, but market growth alone does not prove economic efficiency. It only shows that the infrastructure is being adopted.

The academic contribution of this thesis is to assess tokenisation through a structured lifecycle framework, broaden it, critically evaluate it, and provide an overview of the current infrastructure. The dissertation analyses how tokenisation affects issuance, exchange, servicing, and redemption. This framework is useful because efficiency gains and risks do not appear in the same way at every stage. In issuance, the main questions concern legal ownership, asset backing, investor eligibility, and the role of intermediaries. In exchange, the central questions concern price alignment, trading access, liquidity, and settlement frictions. In servicing, the focus is on dividend or income treatment, corporate actions, and the ability of programmable systems to reduce administrative costs. In redemption, the key issue is whether investors can exit reliably and whether token-market liquidity is consistent with the liquidity of the underlying asset. By structuring the analysis in this way, the thesis links theoretical claims about tokenisation to observable financial and institutional frictions.

The empirical contribution is to apply this framework to tokenised equities, which are less studied than tokenised bonds, money-market funds, and private credit. The selected case is NVDAon, a tokenised equity exposure issued by Ondo Global Markets and linked to NVIDIA stock. This case is suitable because it combines a traditional highly liquid underlying asset with a tokenised structure that can be analysed through both market prices and blockchain data. The case allows the thesis to examine whether tokenisation improves trading flexibility without creating excessive mispricing, whether multi-chain availability supports integrated activity or creates fragmented liquidity, and whether the legal and operational design supports the claims of disintermediation, democratisation, and lower lifecycle frictions.

The main research question is: How far does the tokenised equity structure reduce market frictions across trading and post-issuance activity relative to the theoretical efficiency gains described in the tokenisation literature? To answer this question, the thesis focuses on four areas. First, it examines whether NVDAon maintains price alignment with NVIDIA stock during regular trading hours, overnight periods, and weekends. Second, it analyses how NVDAon activity is distributed across Ethereum, BNB Chain, and Solana in terms of transaction intensity, transfer size, supply dynamics, and gas costs. Third, it evaluates whether the legal and operational design of the Ondo Finance project supports or weakens claims of disintermediation, democratised access, and lower lifecycle frictions. Fourth, it assesses whether the NVDAon case suggests that tokenisation removes existing market frictions or transforms them into new legal, liquidity, and infrastructure-related constraints.

The methodology combines qualitative and quantitative approaches because the research questions cannot be answered with a single type of evidence. The qualitative part uses official Ondo documentation and the Global Markets prospectus to analyse the legal, operational, issuance, servicing, and redemption structure of the product. The quantitative trading analysis compares NVDAon with NVIDIA stock using hourly and daily price data, with specific attention to regular hours, overnight, and weekend behaviour. The on-chain analysis uses transaction data from Ethereum, BNB Chain, and Solana to evaluate the distribution of activity, transfer sizes, supply changes, holder development, and gas costs. This mixed approach is necessary because some tokenisation claims concern prices and transactions, while others concern legal rights, access restrictions, and the structure of financial intermediation.

The thesis is structured as follows. The literature review first introduces the technology, types of tokenised assets, infrastructure development, and the role of governments and institutions. It then uses the asset lifecycle framework to analyse efficiency gains, risks, and externalities in issuance, exchange, servicing, and redemption. The methodology section explains the case selection, data sources, trading analysis, and on-chain analysis. The case-study chapter applies the framework to NVDAon and evaluates the results against the research questions. The final sections discuss robustness, limitations, and economic and policy implications. The expected contribution is therefore not to claim that tokenisation is always efficient or always risky. The contribution is to show more precisely where tokenisation creates measurable benefits, where it remains dependent on traditional finance, and under what conditions its net effect can be positive.

Literature Review

Tokenisation remains an emerging research area, requiring evidence from academic literature, regulatory publications and market-infrastructure reports. The existing literature highlights the significant contributions of international governmental institutions and policymakers, as well as leading consultancy firms and major financial institutions, such as Accenture, JPMorgan, and BlackRock, which offer valuable practical insights in their industry reports on the implications and key concepts.

The literature review is divided into two parts. The first part introduces essential terminology and key principles of tokenisation, explaining how the technology works and how token types differ. Additionally, I will discuss the various types of tokens and their financial characteristics. Also, the current state of infrastructure and the roles of government and institutional investors will be highlighted in this context. Since there are now sufficient publications and reports explaining how the technology works, it is more important to focus on the infrastructure and assess the impact of implementing the studied innovation. This work primarily focuses on finance and market efficiency rather than the technological part. I will cover only the fundamental theories necessary for understanding the technology, enabling clearer comprehension in the following sections. For reliable explanations and further details, I will refer to technical industry reports from top consulting firms and institutions, which best explain how the technology works.

This brings us to the second part of the literature review, which focuses on the IMF's lifecycle of assets, utilising relevant studies to explore the efficiency gains and risks associated with tokenisation. My goal is to extend this framework with other academic publications that have assessed the positive and negative impact of tokenisation. This will establish the framework for the final part of the case study analysis and gather the necessary academic background for further research.

1. Technology and Infrastructure Overview

1.1 Definition of Tokenisation

The literature broadly agrees that tokenisation in financial markets means creating a digital token, or a digital representation of an asset, on a ledger that can be shared across participants, trusted as a record of positions and transfers, and used to execute programmed rules (Agur et al., 2025; IOSCO, 2025). In this sense, tokenisation is not simply the digitalisation of finance, because financial assets have long existed in electronic form. The relevant change is that recordkeeping, transfer, and some transaction rules can be integrated within a shared ledger environment. Baltais and Sondore (2024) and the World Economic Forum (2025) present this as the technological basis for lower administrative costs, greater automation, and potentially faster transfers.

However, tokenisation is not a single uniform model. Different systems offer different degrees of shared access, governance, and programmability, so the presence of a token does not by itself reveal how efficient or scalable the arrangement will be (Agur et al., 2025). This distinction is important for the dissertation because broad claims about "tokenised finance" often describe theoretical system capabilities rather than the concrete structure of a given product.

For this dissertation, it is also necessary to distinguish tokenised real-world assets from digital-native assets. Digital-native assets exist only on the ledger and do not depend on an external asset for their legal or economic existence. By contrast, tokenised RWAs represent rights linked to an off-chain asset such as a bond, equity, fund share, commodity, or cash-flow claim (Baltais & Sondore, 2024; Agur et al., 2025). The token, therefore, matters only if the legal and operational link to the underlying asset is credible. This is why the literature on RWA tokenisation places greater emphasis on institutional design than that on purely crypto-native tokens.

1.2 Ledger Design

The literature does not treat all tokenised ledgers as institutionally equivalent. Agur et al. (2025) distinguish between single-operator, permissioned, and permissionless designs, while WEF (2025) also stresses that infrastructure choices shape governance, participation, and supervision. This means that the same tokenisation label can cover systems with very different degrees of openness, control, and operational complexity. For financial markets, ledger design is therefore not a purely technical issue. It affects who maintains the record, who validates transfers, and how credible the system is for regulated activity.

This point already introduces an important qualification in the literature. Tokenisation is often presented as a major technical innovation, but the literature shows that its economic effects depend on the institutional environment in which the ledger operates. The relevant question is not only whether a ledger exists, but whether that ledger can function as a reliable part of market infrastructure.

1.3 Fundamental Features of Digital Token Ledgers

The IMF identifies sharedness, trust, and programmability as the central features of tokenised ledgers (Agur et al., 2025). The literature broadly agrees that these features explain the potential efficiency gains most often associated with tokenisation. Sharedness may reduce reconciliation across fragmented registries. Programmability may automate transfer restrictions, payments, collateral movements, and other lifecycle events. Trust, whether created through institutional governance or distributed validation, is necessary for the ledger to function as a credible record of ownership and transfer (Agur et al., 2025; WEF, 2025).

The literature also suggests a more nuanced interpretation of this efficiency argument. First, these features can vary across single-operator, permissioned, and permissionless systems, so tokenisation does not automatically imply open participation or disintermediation (Agur et al., 2025). Second, some coordination gains can also be achieved through better integration of conventional databases and market infrastructures, without full asset tokenisation (Agur et al., 2025). Therefore, the literature does not support the claim that tokenisation is inherently superior in every case. Its benefits depend on how the ledger is designed and on whether the supporting market infrastructure can actually use those features.

This point explains that, in theory, programmability can combine asset logic, transfer conditions, and settlement rules within a single environment. In practice, however, the value of that automation depends on whether legal, operational, and payment systems are aligned with the ledger design. This means that technological capability and realised market efficiency should be treated as related but separate questions.

1.4 Asset Tokenisation Models

A central distinction in the literature is between native and non-native tokenisation. In native tokenisation, the asset is issued directly on the ledger, and the ledger serves as the primary record of ownership and transfers. In non-native tokenisation, the token represents an off-chain asset that continues to exist within traditional legal and custodial structures (Agur et al., 2025; J.P. Morgan & Apollo, 2023). The literature broadly agrees that this distinction is economically important because the strongest claims about lower intermediation and simpler settlement are more probable in native models, while most current RWA products remain non-native and therefore depend on off-chain custody, legal documentation, and investor onboarding processes.

Baltais and Sondore (2024) reach a similar conclusion through a broader classification of tokenisation methods. Their framework shows that token structures differ not only by technology but also by the strength of backing and the way risk is allocated between issuers, custodians, and investors. Beeson, (2025) likewise shows that many current market structures rely on SPVs, funds, or other legal wrappers rather than direct on-chain title. The literature, therefore, does not reject tokenisation, but it does reject the idea that all token models have the same legal or economic implications.

The main implication of this dissertation is straightforward. When the token is a wrapper around an off-chain asset rather than the legally authoritative asset itself, efficiency gains may still arise in transferability, visibility, and automation. However, legal dependency on custodians, issuers, and registrars remains. This is one reason why the literature treats tokenisation as an infrastructure question rather than only as a product design innovation

1.5 Definition of Rights

The literature is especially cautious on the question of rights. It broadly agrees that the value of a tokenised real-world asset depends not only on the existence of the token, but on the legal strength of the claim connecting the token holder to the underlying asset. Lavayssiere (2025) clearly distinguished between complete and incomplete tokenisation. In complete tokenisation, the token embodies an enforceable legal right. In incomplete tokenisation, the token may serve only as a digital representation or contractual interface, without fully transferring the underlying legal right.

This argument is reinforced by IOSCO (2025), which notes that existing legal frameworks for securities and other financial instruments were built for paper-based or book-entry systems, not for tokens moving across distributed ledgers. As a result, an on-chain transfer may be technically valid while the legally decisive record of ownership still remains off-chain with a transfer agent, registrar, custodian, or other recognised intermediary. Martino and Ringe (2025) make a related point when they argue that blockchain can improve recordkeeping, but cannot, by itself, resolve questions of legal finality, rectification, or dispute resolution.

Here, the literature shows both agreement and limitations. It agrees that tokenisation can improve the technical handling of records and transfers. It does not agree that control of a token should automatically be treated as legally secure ownership. Possession of the token and ownership of the underlying right may still diverge, especially in regulated markets where compliance, investor identification, and formal records remain necessary. Those arguments are important for the claims of disintermediation, lower friction, and democratised access, but they become much weaker when token ownership is not equivalent to direct legal ownership of the underlying asset (Mirdala, 2025).

1.6 Current Infrastructure

The current status is that real-world asset tokenisation is developing through hybrid infrastructure rather than through the full replacement of traditional finance. Beeson, (2025) describes a current issuance stack in which the tokenisation platform sits above traditional custody and legal documentation, while a more fully native structure remains a future possibility rather than the dominant present model. IOSCO (2025) reaches a similar conclusion by describing tokenisation as a complementary channel that can coexist with conventional clearing, settlement, custody, and recordkeeping arrangements. In other words, the literature broadly agrees that tokenisation today usually reconfigures intermediation rather than removes it.

This hybrid structure has practical consequences. Custody often exists at two levels simultaneously: the underlying asset must remain in off-chain custody or legal control, while the token itself requires secure key management and digital-asset custody arrangements (Schueffel & Stuessi, 2025; IOSCO, 2025). At the same time, new specialised roles appear, including smart-contract auditors, node operators, interoperability providers, and digital custodians (WEF, 2025). The result is not a market without intermediaries, but a market with a different mix of old and new intermediaries. This is why the literature increasingly treats tokenisation as institutional redesign rather than simple technological substitution.

Despite the rapid development, scale and readiness are the biggest concerns of the current infrastructure. More optimistic sources emphasise that tokenisation can improve coordination, automate parts of settlement and servicing, and support more flexible trading and portfolio management (Baltais & Sondore, 2024; J.P. Morgan & Apollo, 2023; WEF, 2025). However, IOSCO (2025), OECD (2025), and FSB (2024) all qualify these claims. They point to a lack of interoperability across DLT environments, limited secondary-market depth, uncertainty around custody and settlement finality, and the ongoing absence of widely available settlement assets that meet regulated-market requirements. FSB (2024) goes further by arguing that many claimed benefits remain unproven at scale and may involve trade-offs that offset some of the promised efficiency gains.

This is also where market structure becomes central. IMF (2025) and OECD (2025) both suggest that tokenisation can reduce reconciliation and coordination costs, but only if users, assets, and payments can interact across compatible infrastructures. If tokenised activity becomes dispersed across separate ledgers, venues, or chains, then tokenisation may replace one form of fragmentation with another. The literature, therefore, does not deny the possibility of efficiency gains. It treats them as conditional on interoperability, governance, liquidity, and the availability of suitable settlement assets.

Public-sector and institutional pilots support this cautious interpretation. Project Guardian, the EU DLT Pilot Regime, and the Swiss SDX and Helvetia initiatives show that authorities and large financial institutions are treating tokenisation as a serious area of infrastructure development rather than as a purely speculative trend (OECD, 2025; Agur et al., 2025; FSB, 2024)[2]. However, these examples also show that adoption remains concentrated in controlled environments, permissioned systems, and legally supervised experiments. Their significance lies less in proving that tokenisation is already mature than in showing which conditions policymakers consider necessary before larger-scale implementation becomes possible: legal clarity, recognised market infrastructure, credible settlement assets, and operational interoperability (Zhang, Gong, Zhou, 2024).

Consequently, we can see that the infrastructure is already in the development phase but still requires a more defined framework to attract additional investors and projects, ultimately bringing in more liquidity (Schueffel & Stuessi, 2025). Another important insight, mentioned in several publications, is the need for a settlement asset, whether in the form of a central bank digital currency or another asset that aligns with the legal framework (IMF, 2025). These two factors—legal frameworks and settlement assets—present significant barriers for large institutional investors and ecosystem builders.

[2] Further information on the public and institutional tokenisation initiatives discussed in this section is available from the official webpages of the respective authorities and infrastructure providers: the EU DLT Pilot Regime is described in Regulation (EU) 2022/858 on a pilot regime for market infrastructures based on distributed ledger technology, available at https://eur-lex.europa.eu/eli/reg/2022/858/oj/eng

; Project Guardian is described by the Monetary Authority of Singapore as an initiative testing asset tokenisation and decentralised finance applications in a regulated institutional context, available at https://www.mas.gov.sg/schemes-and-initiatives/project-guardian

; Project Helvetia is described by SIX Digital Exchange as a pilot for settling tokenised assets in central bank money, available at https://www.sdx.com/news/project-helvetia-settling-tokenised-assets-in-central-bank-money/

Taken together, the literature suggests a balanced conclusion. Tokenisation has clear technical potential to improve coordination, automation, and some forms of transfer and settlement. However, the present market infrastructure remains hybrid, fragmented, and dependent on traditional legal and institutional foundations. For that reason, the literature supports a conditional rather than automatic view of efficiency. This is important for the dissertation because the relevant question is no longer whether tokenisation can work in principle, but whether a specific tokenised equity structure reduces frictions in practice once custody, legal rights, settlement design, and real market usage are taken into account.

2. Efficiency Gains, Risks, Externalities

This chapter shifts from technological foundations to market efficiency and inefficiency across the asset lifecycle. This section aims to highlight the emergence of tokenisation and examine what current studies reveal about its benefits and drawbacks. The goal is to create a connection between the current structure of financial markets and their potential development based on the information provided in the previous chapter. We need to recognise that behind tokenisation and technology are real assets that hold value and utility. However, what has changed is the infrastructure and operational processes. In this context, I would like to address the question: Why do we actually need tokenisation?

To be more specific, I will focus on assets such as bonds, stocks, and commodities. Each asset is traded in the form of either an obligation or an ownership right, both of which are exchangeable. To obtain this right, we must issue the asset using intermediaries by placing it on either the primary or secondary market. Once issued, the asset can be exchanged among investors through financial markets. Some assets may provide interest yields or dividend payments, which involve servicing. Ultimately, the asset returns to the issuer in exchange for cash or other assets. This process is outlined in an IMF paper on the lifecycle of an asset, which includes stages such as issuance, exchange, servicing, and redemption (Agur et al., 2025). It's important to note that not every asset goes through the entire cycle. For example, bonds can be issued and held until maturity without being exchanged during the holding period. Additionally, shares of common stock in a company or perpetuities do not have a maturity or redemption date. In the current market infrastructure, each stage involves various inefficiencies that affect risk, liquidity, and, subsequently, the asset's value (Cisar et al., 2025). Below is a more detailed description of each stage.

2.1 Issuance

Issuance is the stage at which an asset is designed, documented, offered to investors, and recorded in an official ownership system. In conventional markets, this process depends on legal documentation, due diligence, allocation procedures, registrars, custodians, and settlement institutions. The literature broadly agrees that issuance is costly not only because of the economic risk of the asset itself, but also because market access depends on intermediation, information production, and recordkeeping (Agur et al., 2025; Cisar et al., 2025).

2.1.1 Market Frictions

The first major friction at issuance is information asymmetry. Issuers and informed intermediaries usually know more about the asset than final investors, so investors may demand discounts to compensate for valuation uncertainty. This issue is especially important in primary markets, where investors cannot yet rely on secondary-market price discovery and must depend more heavily on prospectuses, underwriters, and due diligence processes (Cisar et al., 2025). When transparency is weak, issuance becomes more expensive because investors price in uncertainty. Information search frictions arising from the lack of transparency in shared asset characteristics make it more difficult to evaluate background information, especially for small-value issuances (Agur et al., 2025).

The second friction is the cost of intermediation and recordkeeping. Traditional issuance requires legal drafting, registrar functions, allocation management, settlement coordination, and official ownership records. These are not trivial administrative details. They are part of the cost of making the asset investable and enforceable. Because many of these costs are fixed, smaller issuances are often disproportionately expensive, which limits market access for smaller firms or projects (Cisar et al., 2025). This is one reason why issuance efficiency matters particularly in bond, ABS, and private-market settings.

The third friction concerns agency costs and market power. Underwriters, placement agents, and other intermediaries perform useful functions, but their incentives do not always fully align with those of issuers or final investors. Gustafson and Iliev (2017) show that when issuers depend more heavily on intermediary-controlled issuance channels, discounts can be materially larger. In this sense, part of the issuance discount reflects intermediation structure rather than pure asset risk. The literature therefore treats issuance frictions not only as technical costs but also as pricing effects created by the organisation of the primary market.

2.1.2 Benefits Contributed by Tokenisation

The literature broadly agrees that issuance is one of the stages where tokenisation can offer meaningful process improvements. A shared ledger can reduce duplicated records and simplify the distribution of ownership information across participants, while programmable rules can automate allocation logic, transfer restrictions, investor eligibility checks, and parts of the documentation workflow (Agur et al., 2025; IOSCO, 2025). In principle, this lowers operational complexity and reduces the number of reconciliation steps between issuers, agents, and investors.

These gains appear strongest where issuance is highly standardised. Cisar et al. (2025) argue that tokenisation can shorten issuance chains by combining recordkeeping and execution logic into a single system. Similarly, Leung et al. (2023) show that tokenised bond issuance can improve process efficiency through shorter settlement cycles, fewer intermediary steps, and easier fractionalisation. Empirical evidence from asset-backed securities also supports the argument that blockchain-based issuance may reduce financing costs under certain conditions.

Liu, Shim, and Zheng (2023) examine approximately 5,000 ABS products issued in China between 2015 and 2020 and find that blockchain adoption reduced yield spreads by about 25 basis points after controlling for observable differences between blockchain-based and conventional ABS products. However, the effect was not uniform across all products, which supports the broader conclusion of this dissertation that tokenisation benefits depend on asset type, institutional design, and the quality of market infrastructure. The literature therefore supports the view that tokenisation can lower some issuance costs, especially where the product structure is relatively simple, and investor onboarding can be standardised.

Tokenisation may also reduce some information frictions when relevant data are embedded more directly into the token arrangement. Agur et al. (2025) notes that programmable issuance can connect the instrument to data such as term sheets, eligibility restrictions, and selected asset information, making the issuance process more transparent and easier to audit. The BNP Paribas tokenised bond example embedded the term sheet and ESG data in the token to improve transparency for a small-scale issuance (Agur et al., 2025). In theory, this can reduce the need for repeated institution-by-institution verification and make the primary market more accessible. However, the literature also states that this gain depends on the quality of the underlying data and on whether the market accepts the token record as a credible source of information.

2.1.3 Risks and Concerns

The issuance efficiency also depends on the legal and structural risks created at this stage. The first concern, discussed in the previous chapter, is that token ownership may not be identical to legal ownership of the underlying asset. IOSCO (2025) emphasises that, in many jurisdictions, a token transfer does not automatically transfer the legally decisive claim. If the legal register remains off-chain, then tokenised issuance may add a new digital layer without removing the old legal one. In that case, part of the expected efficiency gain disappears.

The second concern relates to the representation of the asset itself. In non-native structures, the investor often buys a claim on a wrapper, SPV, or custodial arrangement rather than on the underlying asset directly. OECD (2025) and FSB (2024) both stress that this can make the real credit, custody, and redemption structure harder to understand, especially when tokenised claims are layered, fractionalised, or reused across platforms. From an investor-protection perspective, this is not only a legal risk. It is also an externality, because unclear structures can distort pricing and weaken trust in the broader market.

The third concern is operational. Smart contract errors, faulty token standards, key management failures, and oracle issues can affect the validity of issued tokens and the correctness of initial allocations (IOSCO, 2025; OECD, 2025). Because these errors may be embedded at the creation stage, they can affect the entire later lifecycle of the asset. This means that tokenisation can streamline issuance, but it also raises the cost of getting the design wrong. The literature therefore supports a conditional conclusion: tokenisation can reduce issuance frictions, but only where legal rights, asset backing, and technical controls are clear from the start.

2.2 Exchange

The exchange stage covers secondary trading and post-trade transfer of ownership. This is the stage where the efficiency claims of tokenisation are often most visible, because trading costs, settlement delays, and fragmented market structures are easier to observe directly. At the same time, this is also the stage where the literature most clearly warns that tokenisation may transform, rather than eliminate, existing frictions.

2.2.1 Market Frictions

In conventional secondary markets, the main frictions are transaction costs, search frictions, and settlement risk. Trades often pass through brokers, dealers, clearing houses, CSDs, custodians, and cash-settlement systems, each with its own records and procedures. This structure supports market integrity, but it also creates fees, delays, and operational complexity (Agur et al., 2025; IOSCO, 2025). These costs are especially visible in markets with small issue sizes, low turnover, or OTC trading patterns, where liquidity is harder to find, and dealer market power matters more.

Search frictions are particularly important. In many markets, orders and quotes remain dispersed across venues, dealer networks, and bilateral channels. As a result, investors may not know where the best liquidity is located, and market makers may demand wider spreads to compensate for inventory and information costs. The IMF summarises empirical evidence showing that such frictions are economically meaningful. In the UK sovereign and corporate bond markets, estimated welfare losses from decentralised trading reached 7.8% and 12.2%, mainly due to settlement delays and broker market power. In the Canadian sovereign bond market, lowering switching frictions between brokers was estimated to increase investors' welfare by up to 27% through stronger competition and improved access to centralised trading (Agur et al., 2025). Consequently, exchange inefficiency is not only a simple technical delay. It is also a problem of fragmented information and fragmented market access.

Settlement lag is the third major friction. When execution and final settlement are separated in time, counterparties face principal risk and must rely on collateral, margin, and post-trade institutions to mitigate it. OECD (2025) and

IOSCO (2025) note that these protections are valuable, but they also consume balance-sheet capacity and add costs. Traditional exchange, therefore, involves a trade-off: market safety is improved through institutional layering, but speed and simplicity are reduced.

2.2.2 Benefits Contributed by Tokenisation

The literature broadly agrees that tokenisation can reduce some exchange frictions through closer integration of trading, recordkeeping, and settlement. A shared ledger can give authorised participants access to a common record of ownership and transfer, reducing the need to reconcile multiple databases after the trade (Agur et al., 2025). Programmability can support delivery-versus-payment logic, collateral management, and other trade conditions that are difficult to coordinate across fragmented legacy systems (IOSCO, 2025; OECD, 2025).

One of the strongest theoretical benefits is a tighter linkage between asset transfer and cash settlement. Where asset and payment tokens can settle on compatible infrastructure, the risk that one leg settles without the other can be reduced materially. The literature treats this as a real efficiency gain, especially in markets where post-trade chains are long and operationally costly (IOSCO, 2025; OECD, 2025). Faster settlement may also release collateral sooner and lower the amount of capital tied up between execution and final transfer.

Using a global sample of tokenised bonds, Leung et al. (2023) found that, relative to matched conventional bonds issued by the same entities, tokenised bonds have significantly lower underwriting fees and yield spreads at issuance, and trade with tighter bid-ask around 5.3% lower for tokenised bonds, while the liquidity effect increases to 10.8% when these bonds are accessible to retail investors (Leung et al., 2023). Further findings indicated that price discovery in a secondary market reduced bid-ask spreads by 8.5% after issuance. Tokenisation may broaden market participation and support liquidity through smaller denominations, fractional ownership, and potentially continuous market access (Leung et al., 2023).

2.2.3 Risks and Concerns

The strongest qualification at the exchange stage is fragmentation. IOSCO (2025), OECD (2025), and WEF (2025) all point to the lack of interoperability across ledgers, settlement assets, identity systems, and trading venues. If the same asset trades across multiple incompatible platforms, tokenisation may replace a single fragmented market with several smaller fragmented markets. In that case, price discovery, liquidity concentration, and settlement efficiency may weaken rather than strengthen.

Second, there are important trade-offs associated with atomic and near-instant settlement. While simultaneous settlement reduces counterparty risk, the OECD stresses that fully instant T+0 settlement can eliminate the possibility of netting obligations, require substantial pre-funding of both cash and securities, and increase intraday liquidity needs for dealers and market makers (OECD, 2025). These effects may constrain short-selling, market-making inventory management, and other activities that support secondary market liquidity, so the literature argues for programmable, rather than necessarily instantaneous, settlement cycles that are calibrated to market needs rather than a one-size-fits-all T+0 model (OECD, 2025).

The third concern is that tokenised trading introduces new operational and governance risks. Smart-contract failures, cyberattacks, node outages, and private-key issues can affect many positions simultaneously because they operate at the infrastructure level rather than the transaction-by-transaction level (IOSCO, 2025; OECD, 2025).

In addition, continuous 24/7 trading of tokenised assets can clash with the limited opening hours and liquidity of underlying traditional markets. Carapella et al. note that stress events over weekends or holidays could lead to large price moves in token markets at times when underlying assets cannot be traded or valued, making it difficult for issuers and intermediaries to meet redemptions and potentially undermining the solvency or liquidity positions of exposed institutions (Carapella et al., 2023). Automated margining or liquidation mechanisms in DeFi protocols that accept tokenised real-world assets as collateral could further accelerate such dynamics (Carapella et al., 2023).

2.3 Servicing

Servicing includes coupon and dividend payments, principal distributions, corporate actions, and related portfolio processes after issuance. Compared with issuance and exchange, this stage attracts less public attention, yet the literature suggests it may still entail meaningful inefficiencies because it relies heavily on accurate records, repeated reconciliation, and coordinated payment flows.

2.3.1 Market Frictions

The central friction in servicing is the separation of records. In conventional markets, issuers, registrars, CSDs, custodians, and fund administrators may all maintain relevant parts of the holder and payment record. This creates repeated reconciliation needs, especially around record dates, coupon payments, dividend distributions, and corporate actions (Agur et al., 2025). The process can work reliably, but it remains operationally costly and often dependent on batch processing rather than real-time updating.

These frictions are even clearer in collateral management, securities financing, and repo-related workflows. WEF (2025) describes these areas as large but operationally fragmented markets in which disconnected systems create delays, settlement chains, and liquidity inefficiencies. Onyx J.P. Morgan and Apollo (2023) make a similar point from a market-practice perspective: servicing data is often separated from portfolio management and cash deployment, so cash flows are processed, recorded, and reinvested through disconnected workflows rather than through a single operational system.

The literature, therefore, treats servicing frictions as less visible than trading spreads, but still economically relevant. Delays in identifying holders, processing payments, and updating positions affect both issuers and investors. They increase operating costs, complicate liquidity management, and slow the redeployment of incoming cash.

2.3.2 Benefits Contributed by Tokenisation

The literature broadly agrees that servicing is an area where programmability can generate genuine efficiency gains. If ownership is recorded on a shared ledger, the issuer or its agent can identify the relevant holders at the record date directly from the system of record, rather than relying on several reconciled books (Agur et al., 2025). Smart contracts can then calculate and distribute dividends, coupons, and other cash flows according to predefined rules. In principle, this reduces manual administration and lowers the scope for timing errors.

The benefits may be greater in workflows that involve repeated collateral, interest, and cash management events. Onyx J.P. Morgan and Apollo (2023) estimated that automating the reinvestment of idle cash through tokenised portfolios and on-chain money-market instruments could reduce the average portfolio management fee charged to investors by around 24 basis points, assuming benefits are fully passed through (Onyx J.P. Morgan & Apollo, 2023). Their estimate that automated reinvestment could improve investor outcomes is useful as an illustration of the potential efficiency channel, although the literature also suggests that such benefits are currently most realistic in tightly controlled institutional environments rather than in open public-market settings.

2.3.3 Risks and Concerns

The literature also warns that servicing automation can create new expectations and new complexity. FSB (2024) stresses that if tokenised products offer more frequent distributions, faster exits, or highly flexible cash-flow features, investors may come to expect a degree of immediacy that is inconsistent with the liquidity of the underlying asset. In that sense, servicing design can create behavioural and liquidity externalities, not only operational benefits.

The legal issue also remains unresolved in many structures. If the legally binding holder register remains off-chain, then on-chain servicing may not be fully decisive in a dispute, insolvency, or enforcement event (OECD, 2025; IOSCO, 2025). This means that tokenisation can simplify the operational side of servicing while leaving the legal side partly dependent on conventional intermediaries. The expected gain is therefore conditional on the same institutional issues that constrain other lifecycle stages.

A further concern is product complexity. Agur et al. (2025) and FSB (2024) both suggest that programmability can encourage more complex payout structures, including products with multiple triggers, reinvestment rules, or links to DeFi mechanisms. These designs may increase flexibility, but they also make risk harder to evaluate, especially for less sophisticated investors. The literature therefore supports a balanced conclusion: tokenisation can make servicing more efficient, but it can also make income streams more opaque and more sensitive to governance failures.

2.4 Redemption

Redemption is less studied in the literature and is often combined with servicing, as it is mainly associated with securities with a specified maturity or expiration date, such as bonds or mutual fund shares that are ultimately converted into cash or another asset at redemption (Agur et al., 2025). As in the previous sections, many frictions and potential efficiency gains at redemption are closely related to those already discussed under servicing and exchange—namely transaction costs, information frictions, and counterparty risk—but they materialise at the specific moment when investors try to exit and realise value (IOSCO, 2025). In hybrid structures, this stage often reveals the real dependence of tokenisation on off-chain institutions.

2.4.1 Market Frictions

The first friction at redemption is the need to accurately identify final holders and coordinate final payments across multiple institutions and ledgers. In conventional markets, this may involve registrars, custodians, paying agents, settlement systems, and cross-border cash channels. Agur et al. (2025) and IOSCO (2025) both treat this as a transaction-cost and operational-risk problem, especially when large notional amounts must be processed at once.

The second friction is liquidity mismatch. Redemption may appear administratively similar to servicing, but economically it is often more demanding because the whole claim must be honoured rather than only an income payment. This is especially important in open-ended funds or products backed by less liquid assets, where investors may expect frequent redemptions even though the underlying market is thin, segmented, or open only for limited hours (FSB, 2024; IOSCO, 2025). In such cases, redemption is not just an operational task. It is a test of market structure and liquidity management.

Cross-border and multi-currency settings add a further layer of complexity. OECD (2025) notes that multiple payment systems, settlement windows, and jurisdiction-specific intermediaries may still be required even where the asset itself is tokenised. This means that redemption frictions are often concentrated precisely at the point where tokenised systems reconnect to conventional money and legal settlement.

2.4.2 Benefits Contributed by Tokenisation

The literature supports the idea that if the token ledger functions as an authoritative or operationally central holder register, the issuer can identify token holders directly and process redemptions using predefined rules, rather than relying on multiple reconciled ownership chains (Agur et al., 2025; IOSCO, 2025). This can reduce administrative delays and make the exit process more transparent.

The strongest examples come from controlled infrastructures where both the asset record and the settlement asset are integrated. In the UBS digital bond issued on SIX Digital Exchange (SDX), the main register of intermediated securities is the DLT-based CSD, and redemption at maturity is processed by updating the DLT registry and simultaneously transferring a tokenised cash asset (tCHF or wholesale CBDC) to the same set of participant nodes (IOSCO, 2025). Legally, the bond remains equivalent to a conventional Swiss franc note, but operationally, the identification of holders and the final redemption payment happen within a single infrastructure rather than across multiple reconciled systems (IOSCO, 2025). In such cases, tokenisation does not merely digitise the claim. It shortens the operational chain between ownership identification and final payment.

Not instantly visible, but to my mind also important development that tokenisation can bring is transparency. FSB (2024) notes that tokenised structures can make outstanding supply, prior redemptions, and encoded redemption conditions more visible to investors and supervisors. This does not eliminate redemption risk, but it can reduce some information asymmetry about who may redeem, how redemption works, and under what conditions it may be delayed or restricted.

2.4.3 Risks and Concerns

The biggest concern about redemption arises when token-market flexibility exceeds the liquidity of the underlying asset. FSB (2024) argues that if tokenised claims can be traded or redeemed more frequently than the underlying asset can be liquidated, tokenisation may intensify run dynamics rather than reduce them. This is a clear example of an externality: a design intended to improve investor flexibility can increase pressure on issuers, force asset sales, and transmit stress across connected markets.

The second concern is that, in practice, redemption rights are often restrictive or asymmetric. Many non-native tokenised assets do not give all holders a simple, direct right to redeem with the issuer. Instead, redemption may depend on minimum size, eligibility rules, geographic restrictions, or issuer-controlled processes. Where this is the case, tokenisation may support secondary-market transferability without delivering the stronger promise of reliable convertibility into the underlying asset or cash. The literature therefore treats redemption design as one of the key points at which product marketing and economic reality may diverge.

The third concern is continued dependence on traditional payment rails and settlement assets. Even if the token leg is processed on-chain, final payment may still depend on bank accounts, cut-off times, or separate cash infrastructures if widely accepted tokenised settlement assets are not available (OECD, 2025; FSB, 2024). Running token and legacy systems in parallel can therefore increase complexity rather than remove it. For this reason, redemption is often the lifecycle stage that most clearly shows whether tokenisation has actually simplified the financial process or merely added a new technological layer to the old one.

Taken together, the lifecycle literature supports a conclusion that tokenisation can reduce frictions at each stage of the asset lifecycle, especially those related to reconciliation, manual processing, transferability, and coordination of records and payments. However, the gains are not uniform. They are strongest where legal rights are clear, settlement assets are available, infrastructure is interoperable, and the underlying asset is liquid enough to support the promised speed and flexibility.

The same literature also shows that tokenisation can generate new frictions and externalities. These include legal ambiguity, liquidity fragmentation, higher pre-funding needs, complex layered claims, run risk, cyber and governance vulnerabilities, and continuing dependence on off-chain institutions. This is why the dissertation does not treat tokenisation as automatically efficient. Instead, it uses the asset lifecycle to test more precisely where tokenisation reduces frictions, where it only redistributes them, and where new constraints become visible in practice.

Research Questions and Methodology

The next step in the research is to understand how tokenisation works through concrete examples and analyse the efficiency gains and risks we can observe to answer the research questions. The methodology uses a case-study design. This approach is suitable because it allows the research to connect product design, legal structure, price behaviour and on-chain activity in one case. The reason for choosing the case study analysis is simply the technology's immaturity, the lack of available data, and, to my mind, the importance of looking at the problem from different perspectives. Additionally, the research questions require different types of information to assess them. That was also the reason to combine both quantitative and qualitative approaches in the case study. Currently, the most studied assets are bonds and real estate for several reasons: the availability of sandbox infrastructure, a broader spectrum of inefficiencies, and room for development. Nevertheless, I decided to focus on the stock market as an emerging sector of tokenised RWAs, as it is more accessible for open study, less dependent on closed sandboxes or institutional data, and will contribute to the less-studied academic field.

The project "Ondo Finance", hereafter referred to as "Ondo", was chosen because it is the leading distributed platform for tokenised assets and the top platform for stock tokenisation, with a current market share of around 60% based on data from the analytical data provider RWA.xyz (RWA.xyz, n.d.). Unlike their competitors StockX and Robinhood, the platform is mainly focused on qualified and institutional investors. (Ondo, n.d.). I will describe the operational and legal parts more deeply in the case study analysis part.

Regarding the sources used, the Ondo provides the technical, legal, and operational insights necessary to understand the core business in their documentation (Ondo, n.d.). The documentation available directly on the platform's webpage. Next, the "Base Prospectus" provides further legal and risk information (Ondo Global Markets BVI Limited, 2025)[3]. On-chain analytical

[3] Ondo platform information and asset-level pages were accessed through the Ondo Global Markets application. The platform interface was used to review available tokenised equity

tools like RWA.xyz, DeFiLama, Dune.com, and Messari.io offer a variety of dashboards and blockchain data, including current market capitalisations, volumes, and the general applications of tokenised equities across protocols and for specific assets themselves. This is especially useful for comparison and an analytical overview. Those aggregators utilise the transparency and openness of the blockchain data to form structured reports and real-time information. Specifically for my research, they enabled to see the DeFi usages of the tokens and their total values locked in the protocols and liquidity pools.

Using the tools mentioned above, I will describe the process of tokenising equities. Using tokenised stocks, a digital representation of the equities, as an example, I will apply the knowledge gained from the previous chapters to explain the process in detail and go through the asset lifecycle. I will provide the descriptive statistics of on-chain data to show the current status and impact of tokenisation. During the analysis, I was mainly focused on understanding the presence of transaction costs, democratisation and fragmented liquidity confirmation, the impact of the trading throughout the different time windows, and finally, the substantial difference between trading real stocks and their tokenised versions.

For the trading analysis, I performed a comparison of the NVDIA underlying stock with the token issued by Global Markets platform NVDAon, which bears an economic exposure of the underlying stock, including dividends and net of applicable withholding taxes. The main goal was to determine whether there is a difference in prices during trading hours, especially during overnight and weekend trading, as the Global Market platform enables 24/5 issuance and redemption, and the token itself can be transferred without time limits. The dataset consists of hourly NVDA prices from Yahoo Finance, hourly NVDAon prices from CoinGecko, and a daily appendix with adjusted closing prices used only for robustness checks[4]. I standardised both series to UTC, rounded token

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products, asset information, and user-facing product structure. Source: Ondo Finance, retrieved 10.04.2026, from https://app.ondo.finance/

[4] Underlying stock's trading data retrieved using public API keys. Retrieved 01.04.2026 from https://finance.yahoo.com/quote/NVDA

Token's aggregated price data were retrieved using CoinGecko Demo API account. Retrieved 01.04.2026 from https://docs.coingecko.com observations to the nearest hour, and merged them to a common hourly panel for the period from 01/09/2025 to 28/02/2026. Because Yahoo Finance does not provide a reliable adjusted hourly stock series, the intraday comparison relies on the observed hourly closing price of NVDA, while the daily appendix uses adjusted closes to account for corporate actions. Outside U.S. regular trading hours and during weekends, the stock benchmark was forward-filled with the last observed regular-hours price so that the token could be compared with a stable reference when the stock market was closed. On this basis, I calculated the hourly price deviation in percentage terms, simple and logarithmic returns, and cumulative returns for regular hours, overnight, and weekend windows. These measures allow testing whether continuous token trading is associated with systematic premia, discounts, or higher return dispersion relative to the underlying stock and are used to answer the question of the price alignment. A key limitation is that token prices represent aggregated market prices across supported venues rather than chain-specific on-chain prices, and the analysis therefore captures total token-level trading conditions rather than separate price formation on Ethereum, BNB Chain, or Solana. Dividend and split effects were considered only in the daily appendix, not in the hourly stock series.

Finally, I retrieved the on-chain transactions data for three chains Ethereum, Binance Smart Chain (BSC), and Solana for the period of 01/09/2025-28/02/2026. The data in the transformed format reveal on-chain economic activity used to evaluate differences across all chains and to observe the monetary effect of tokenisation. I first verified the contract address on Ethereum and BSC and the mint address on Solana against the official issuing contracts in order to avoid chain-identification errors. I then collected token transfer records from Etherscan V2 for Ethereum and BSC and from Solscan Pro for Solana[5]. Each transaction was transformed into one common dataset containing the UTC timestamp, transaction hash, blockchain, sender address, receiver address,

[5] On-chain transaction data were retrieved from blockchain explorer APIs. Ethereum and BNB Chain token-transfer data were collected through Etherscan V2 API endpoints, while Solana token-transfer data were collected through Solscan Pro API endpoints.

Sources: Etherscan API documentation, retrieved 01.04.2026, from https://docs.etherscan.io/;
Solscan Pro API documentation, retrieved 01.04.2026, from https://solscan.io/

transferred token amount, event type, token price in USD, transaction fee in native units, transaction fee in USD, transfer value in USD, and a transaction-size bucket. The event type indicates the economic direction of token movement and is classified as mint, burn, or transfer. On Ethereum and BSC, a transaction was treated as a mint when the sender was the zero address and as a burn when the receiver was the zero address; otherwise, it was recorded as a transfer. On Solana, the classification relied primarily on the activity labels returned by Solscan, with a missing-address rule applied only when those labels were unavailable. The transferred token amount measures how many NVDAon units moved in a given transaction. For Solana, the raw integer amount was converted into token units by dividing by the token decimals, while for Ethereum and BSC the already standardised transfer amount was used. In order to express economic scale, I calculated amount_usd as the transferred token amount multiplied by the hourly NVDAon price from CoinGecko. Because blockchain transactions do not contain a direct market price, the token price was assigned by backward time matching, which means that the latest available hourly price at or before the transaction time was used. The transaction fee metric captures the cost of the blockchain for processing the transfer. For Ethereum and BSC, txn_gas_fee_native was calculated as gasPrice multiplied by gasUsed, then divided by 10^18 to convert the fee to ETH or BNB. For Solana, txn_gas_fee_native was calculated as the recorded fee divided by 10^9, which converts the fee into SOL. I then calculated txn_gas_fee_usd by multiplying the native-chain fee by the corresponding hourly USD price of ETH, BNB, or SOL, again using backward time matching. To simplify the analysis of transaction scale, each observation was grouped into a transaction_bucket: small for values below USD 100, medium for values from USD 100 to USD 1,000, and large for values above USD 1,000. The buckets proxy for transaction scale and possible user profile, but they do not directly identify whether the transfer is retail investor, institutional investor, treasury-related or market-making activity. After the transaction-level standardisation, I used the data to construct descriptive on-chain metrics for each chain and for the combined sample. Transaction count measures the number of observed token transfers. Token volume is the sum of amount_token_units and shows how many NVDAon units were moved. USD volume is the sum of amount_usd and shows the approximate economic value transferred on-chain. Monthly mint and burn totals were obtained by summing token amounts by event type, while net supply change was calculated as mint volume minus burn volume. Holder development was measured separately from the transfer file through daily balance reconstruction for Ethereum and BSC, whereas the Solana holder series remained too incomplete for a robust comparison. At the end, the holder analysis was omitted because the available holder series did not provide a reliable representation. This limits the holder-development part of the analysis, but it does not change the price-alignment or transaction-cost findings. This design makes the cross-chain evidence comparable, but the interpretation still requires caution. BSC enters the sample later than Ethereum, Solana begins only in mid-January 2026, transfer rows do not reveal the precise economic purpose of a transaction, and USD values are approximate because they depend on matched hourly reference prices rather than exact execution prices. The same pipeline was tested on five additional tokenised equities, but the final methodological discussion focuses only on NVDAon because the data should then be compared across chains separately, which has a different analysis goal and complicates the current analysis. Additionally, NVDAon appeared to be the most complete and internally consistent trading and on-chain evidence within the available sample.

The resulting methodology framework is therefore selective and focused on testing whether tokenisation improves trading flexibility without producing excessive mispricing, whether multi-chain activity supports or weakens the claim of more efficient market infrastructure, and whether the observed legal and operational structure supports the broader promises of democratisation, disintermediation, and lower lifecycle frictions. In that sense, the methodology should be guided by a comparison between theoretical efficiency gains and observable constraints, not by the assumption that tokenisation is efficient by default.

Finally, the following research questions were formed:

How far does the tokenised equity structure reduce market frictions across trading and post-issuance activity relative to the theoretical efficiency gains described in the tokenisation literature?

To assess it, I split it into four different areas:

1. To what extent does NVDAon maintain price alignment with the underlying stock during regular trading hours, overnight periods, and weekends, and what does this imply about the claim that tokenisation improves exchange-stage efficiency?

2. How is NVDAon activity distributed across Ethereum, BNB Chain, and Solana in terms of transaction intensity, transfer size, supply dynamics, and gas costs, and what does this reveal about liquidity fragmentation and infrastructure efficiency in tokenised equity markets?

3. To what extent does the observed legal and operational design of the Ondo Finance project support or weaken the claims of disintermediation, democratised access, and lower lifecycle frictions presented in the literature on tokenisation?

4. Does the NVDAon case suggest that tokenisation mainly removes existing market frictions, or does it rather transform them into new legal, liquidity, and infrastructure-related constraints?

Case Study Analysis

This chapter presents the analysis findings that I will incorporate again into the asset lifecycle to reflect my previous approach to the literature review and to perform the analysis consistently and in a structured manner, which then provides the research conclusion.

3.1 Legal, Operational, General

The NVDAon case shows that tokenisation, in its current form, should not be understood as a direct migration of equity ownership from traditional markets to the blockchain. Legally, the product is not an ordinary NVIDIA share placed on-chain. Ondo describes its tokenised stocks as structured notes issued by Ondo Global Markets (BVI) Limited, a bankruptcy-remote special-purpose vehicle incorporated in the British Virgin Islands, with tokenholder rights governed by Swiss law (Ondo Finance, n.d.). The prospectus states the same point in more formal terms: the securities are blockchain-based tracker certificates, that is, debt instruments seeking to track the relevant underlying asset rather than direct shares of that issuer (Ondo Global Markets (BVI) Limited, 2025). This distinction is central to the dissertation's analytical framework. The investor receives economic exposure to NVIDIA but does not become a direct shareholder and does not receive the full legal bundle of shareholder rights.

This legal design confirms an important argument from the literature review. Tokenisation may reduce some operational frictions, but it does not automatically eliminate intermediation. In the NVDAon structure, intermediation remains visible at several layers: the SPV issuer, the custodial broker-dealer holding the collateral, the tokeniser, the security agent, the KYC and wallet-screening process, and the underlying dependence on traditional market trading venues and reference prices (Ondo Finance, n.d.; Ondo Global Markets (BVI) Limited, 2025). The prospectus explicitly states that tokenholders have no direct proprietary or voting rights in the underlying or the collateral, and that their claims are limited to indirect economic rights exercisable through the security structure and the security agent in a realisation event (Ondo Global

Markets (BVI) Limited, 2025). Therefore, the infrastructure is better described as hybrid than disintermediated.

Operationally, the model is more advanced than conventional broker custody, as the token can be held in a private wallet and moved across multiple public blockchains. Ondo states that the products are transferable, ERC-20-compliant assets that can be held by external wallets and some custodians, while the broader Global Markets stack is available across Ethereum, BNB Chain, and Solana (Ondo Finance, n.d.). However, the existence of public-chain transferability should not be confused with unrestricted permissionlessness. Both the prospectus and Ondo documentation emphasise transfer restrictions, jurisdictional restrictions, and compliance controls, including the exclusion of U.S. persons and the use of KYC, AML, and transaction screening (Ondo Finance, n.d.; Ondo Global Markets (BVI) Limited, 2025). As a result, the token is technologically portable, but institutionally controlled.

From a broader policy perspective, this means that NVDAon does not represent a full replacement of capital market infrastructure. Instead, it adds a programmable distribution and transfer layer on top of existing legal and custodial arrangements. This partly supports the literature view that tokenisation can improve operational efficiency and asset mobility, but it also confirms that current market models still depend on conventional legal wrappers, off-chain custody, and regulated service providers (IOSCO, 2025; Agur et al., 2025). In this sense, the observed model is closer to partial market reconfiguration than to full market redesign.

3.2 Issuance

The issuance phase is not a blockchain-native equity issuance by NVIDIA. NVIDIA shares continue to exist and trade through the conventional U.S. securities infrastructure. NVDAon is created as a second layer that references already-issued shares. This is a crucial point because it weakens any argument that tokenisation here replaces the original issuance function of public equity markets. The product is issued by an SPV in the form of a structured note, with the underlying exposure supported by collateral held under regulated custody arrangements (Ondo Finance, n.d.; Ondo Global Markets (BVI) Limited, 2025).

Therefore, what is tokenised is not the legal share itself, but a claim designed to replicate the share's economic performance.

This layered issuance model offers some practical efficiency gains, but only within clear institutional boundaries. Ondo explains that tokenised stocks can be minted instantly, purchased in fractional amounts, and bought on the platform using USDon, with atomic conversion from USDC when liquidity is sufficient (Ondo Finance, n.d.). The prospectus adds that issuance may follow operational paths in which collateral is acquired, the tokens are then activated and transferred to the investor's wallet, with purchaser fees applied, and the issuer retains discretion over issuance if compliance or operational issues arise (Ondo Global Markets (BVI) Limited, 2025). In other words, the user-facing experience can be much faster and more flexible than a traditional cross-border securities subscription, but the process remains centrally administered and conditional.

The strongest limitation at issuance is access. Ondo states that Global Markets tokens are not available to U.S. persons and that, in the EEA and the United Kingdom, they are offered only to qualified investors or professional clients, subject to onboarding and eligibility review (Ondo Finance, n.d.). The prospectus follows the same logic through Regulation S restrictions, transfer limits, and suitability language directed toward experienced investors capable of bearing high risks (Ondo Global Markets (BVI) Limited, 2025). This has direct implications for the democratisation debate developed in the literature review. Technically, tokenisation lowers the minimum denomination and enables wallet-based holding, but in legal and commercial terms, primary access remains selective. Thus, the NVDAon case does not support a strong claim that tokenisation democratises access to U.S. equities. It rather suggests that tokenisation can increase modularity and operational convenience for already-eligible participants. However, other blockchain projects can enable greater access for retail investors, which makes this argument specific to the concrete example, depending on the core business structure.

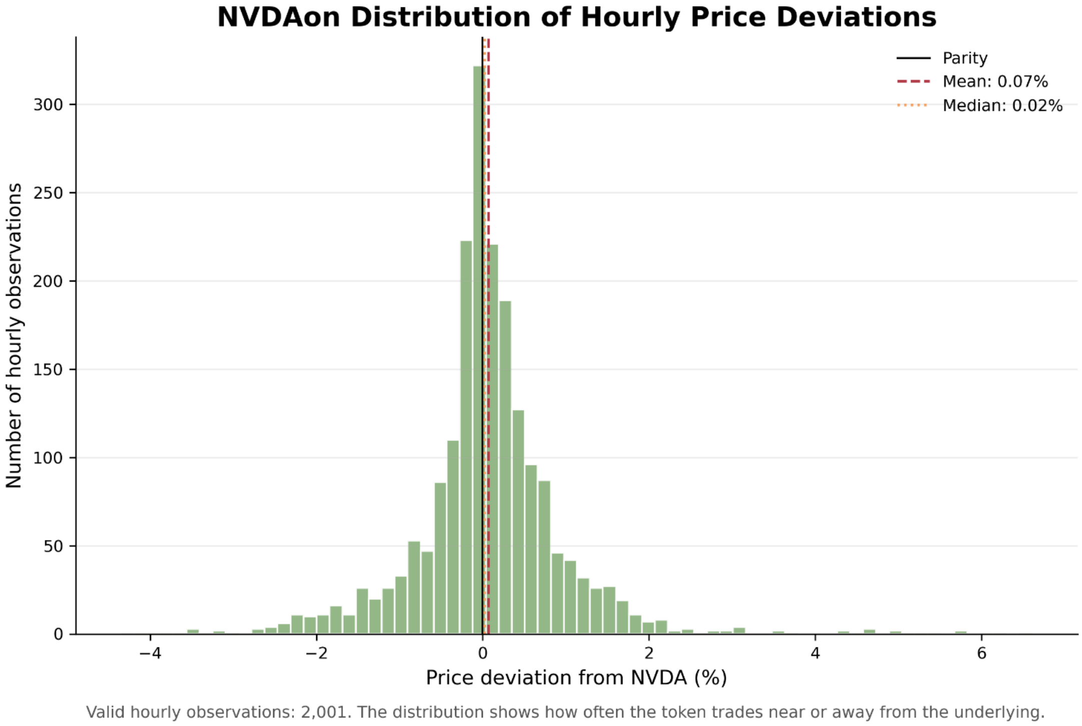
The issuance structure also creates a different risk profile from direct stock ownership. The prospectus repeatedly emphasises issuer risk, insolvency risk, limited recourse, and the possibility that tokenholders may not recover the full amount due even though the product is collateralised (Ondo Global Markets (BVI) Limited, 2025). This means the investor substitutes one type of friction for another. Instead of dealing primarily with direct brokerage access to U.S. stocks, the investor accepts an SPV-mediated claim with additional legal and operational layers. The gain is transferability and programmable settlement; the trade-off is higher structural complexity.

3.3 Trading

The trading stage is the clearest area where the tokenised format offers a visible functional advantage. Ondo's own documentation is explicit that the user receives a quoted executable price rather than a simple public stock quote, and that this quote depends on inventory, market conditions, quote size, target profit, and other proprietary considerations (Ondo Finance, n.d.). It also states that the platform may be unavailable when markets are closed, paused, or subject to risk parameters, which already qualifies the idea of unrestricted 24/7 trading (Ondo Finance, n.d.). In practical terms, the product extends trading access, but it does not create a fully continuous and frictionless market.

The empirical results for NVDAon support this more cautious interpretation. The hourly comparison between NVDA and NVDAon shows that the average hourly price deviation is small, with a mean of 0.0695% and a median of 0.0231%, which suggests that the token broadly tracks the underlying stock over time. However, the tails are economically meaningful. The minimum hourly deviation reaches -4.3454% and the maximum reaches 6.6104%, while 18.29% of hours show an absolute deviation above 1%. This means that the token cannot be described as a perfectly efficient mirror of the stock at intraday frequency. The market tracks, but it also dislocates, which is seen in the figure below.

Figure 1: Price deviations between the underlying stock and token



Source: own calculations

The window analysis is even more important for the argument. During overnight periods, when the cash equity market is closed, the token continues to reprice, and the average token-minus-stock return gap is positive at 0.3185 percentage points, while the average deviation also widens. During regular trading hours, the pattern partly reverses: the token underperforms the stock on average, and the deviation narrows, with a mean token-minus-stock return gap of -0.2026 percentage points. Weekend trading exists, but the data do not show a stable weekend efficiency premium; instead, the average weekend deviation narrows again by Monday open. This pattern suggests that extra trading hours do enable information processing and price adjustment outside stock-market hours, yet part of that adjustment is later corrected once the underlying market reopens.

Therefore, the NVDAon evidence supports a weaker but more defensible conclusion than the simple pro-tokenisation narratives usually claim. Tokenisation clearly improves time flexibility and market access. It allows investors to obtain exposure and trade during periods when the underlying stock market is unavailable. Nevertheless, the evidence does not support the stronger claim that tokenised trading is more price-efficient than the traditional market. If efficiency is defined as faster, more accurate incorporation of information with lower mispricing, the observed overnight widening and later-day convergence suggest that pricing frictions remain substantial. In the terminology of the literature review, the trading stage shows a reduction in temporal access frictions, but not a full elimination of pricing frictions, which is partially caused and cannot be covered by the second-layer infrastructure.

Cost structure also matters here. Ondo states that the main economic cost on the primary trading interface is embedded in the quote, while investors also bear their own gas costs; on secondary venues, other parties may add their own fees (Ondo Finance, n.d.). The prospectus separately allows purchaser fees of up to 0.1% of the market price of the underlying in issuance and redemption (Ondo Global Markets (BVI) Limited, 2025). This is important because lower visible intermediation does not mean zero cost. Instead, costs become partly embedded in spreads, quotes, gas fees, and venue-specific routing conditions. The case, therefore, supports the idea that tokenisation can repackage transaction costs rather than simply remove them. In addition, it makes it even harder to discover the costs, as they are hidden and require a direct quote to see the impact of fees, which is difficult without direct access to the platform.

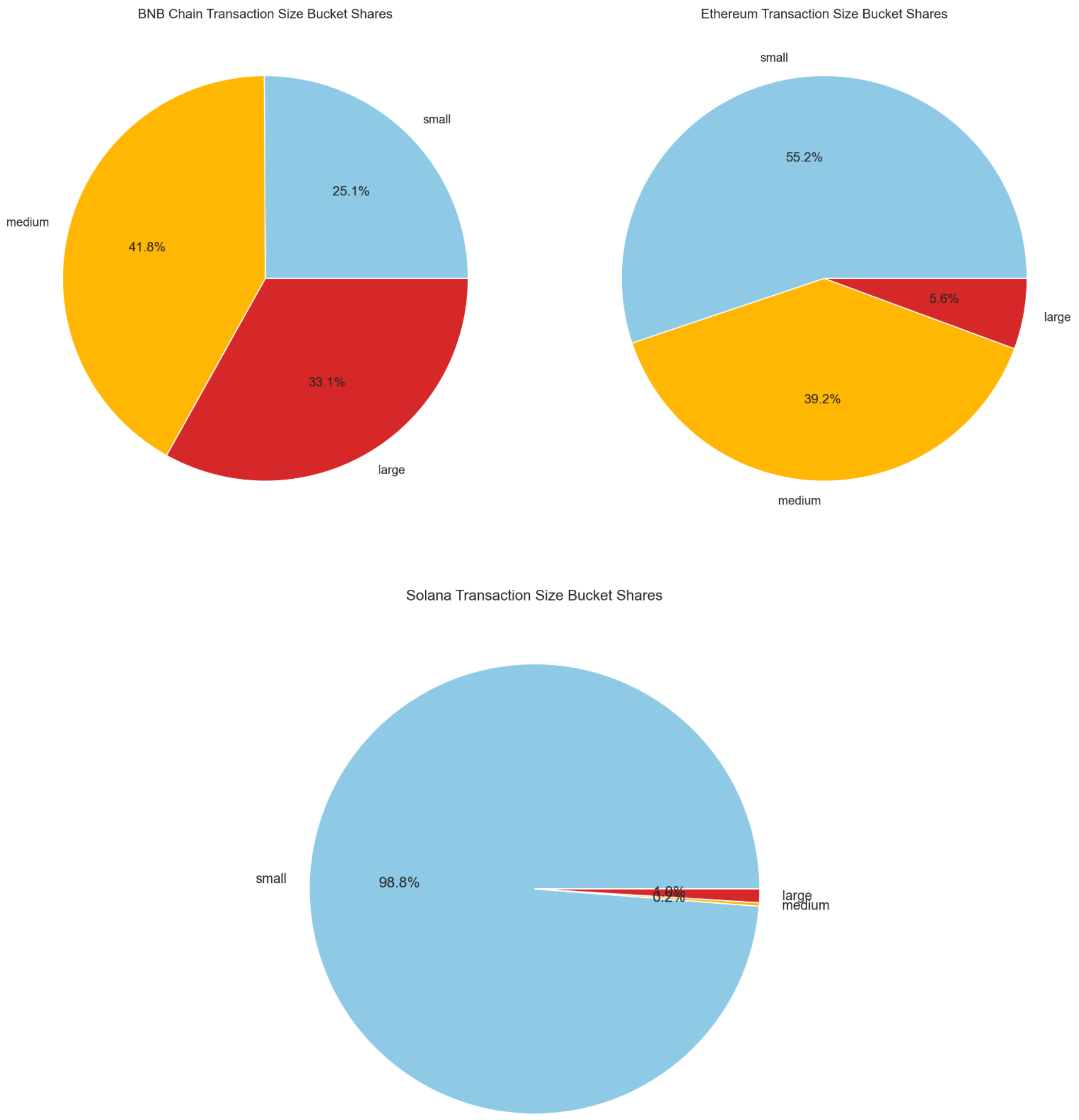
NVDAon is not used evenly across Ethereum, BNB Chain, and Solana. The combined-chain dataset contains 801,514 transfers and approximately USD 1.13 billion in transfer value. However, the merged total is not a good description of a typical transaction because it combines three different activity regimes. BNB Chain is the main venue by both transaction count and economic value. Ethereum is important by transaction count, but much less important by value. Solana is small and late in the sample. This means that NVDAon has a multi-chain footprint, but not a balanced multi-chain market structure.

Transaction intensity shows that BNB Chain is the central activity venue. BNB Chain records 454,223 transfers, compared with 335,258 on Ethereum and 12,033 on Solana. More importantly, BNB Chain accounts for 80.44% of total USD transfer value, while Ethereum accounts for 16.25% and Solana for 3.31%. It means that the majority of observed NVDAon economic movement occurred on BNB Chain. Therefore, the empirical evidence does not support the idea that the three chains play equivalent roles.

Transfer-size statistics show that the chains also differ by user or transaction profile. Ethereum has a median transfer value of USD 99.82 and a median transfer amount of 0.5136 NVDAon. BNB Chain has a much higher median transfer value of USD 399.70 and a median amount of 2.2275 NVDAon. Solana has a median transfer value of only USD 9.97 and a median amount of 0.0533 NVDAon. These numbers show that the chains are not only different in total scale. They are also different in the type of activity they carry. Ethereum is more concentrated around smaller transfers, BNB Chain carries larger-value activity, and Solana is dominated by very small transfers. Since the current transfer data do not reveal the full intent behind each movement, it is not possible to conclude that most activity reflects advanced servicing functions rather than basic transfer, treasury, routing, or market-making behaviour. Therefore, programmability exists as infrastructure capacity, but the observed service layer remains narrow in practice.

The transaction-bucket results confirm this structural difference. Across all chains, 38.78% of transfers are small, 40.09% are medium, and 21.13% are large. But this merged distribution hides the chain split. On Ethereum, 55.17% of transactions are small, and only 5.64% are large. On BNB Chain, only 25.09% are small, while 33.10% are large. On Solana, 98.77% of transfers are small, and only 0.98% are large. Below are charts providing details of transaction size bucket shares for each chain.

Figure 2: Transaction size bucket shares

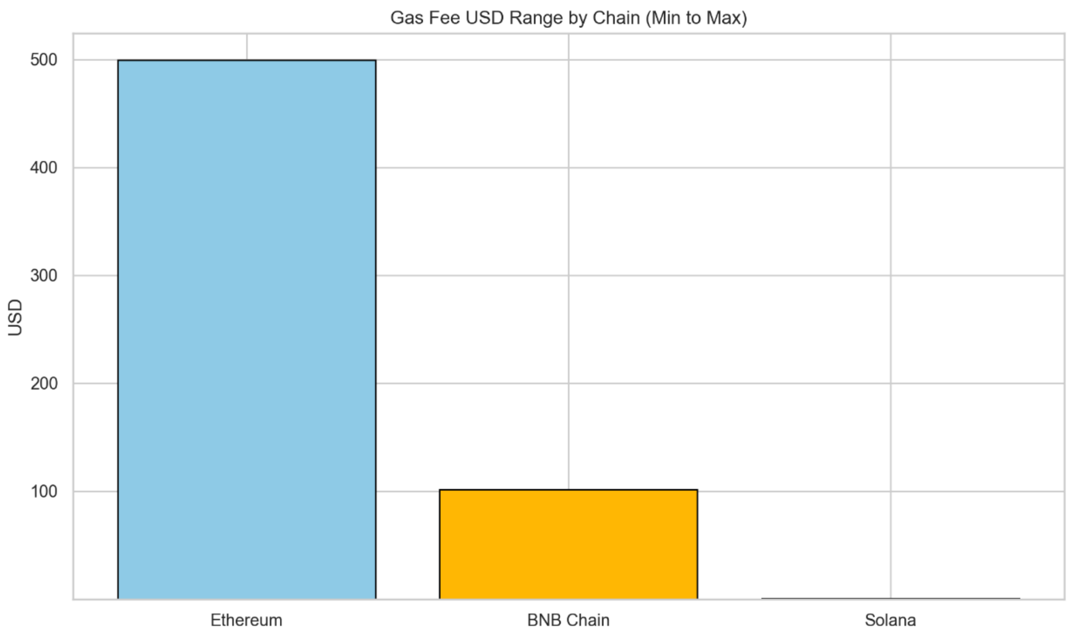


Source: own calculations

This directly answers the infrastructure-efficiency part of the research question. Low-cost or high-throughput chains do not automatically create the same type of activity. BNB Chain appears to combine lower costs with larger-value movement. Solana has very low fees, but in this sample, it does not yet show deep economic usage. Ethereum remains active, but its higher cost environment is consistent with a smaller-value and more fragmented transfer profile.

Gas-fee statistics provide the strongest evidence of chain-level cost differences. Ethereum is the high-cost venue, with a median transaction gas fee of USD 1.3492 and a mean of USD 2.4157. BNB Chain is much cheaper, with a median of USD 0.0238 and a mean of USD 0.0468. Solana is cheaper again, with a median of USD 0.0010 and a mean of USD 0.0012. On the chart below, we can observe the extremes of gas fees for each chain.

Figure 3: Gas fees extremes by chain



Source: own calculations

The economic implication is that the same token faces very different transaction costs across chains. Ethereum accounts for 97.44% of total observed gas fees, even though it represents only 16.25% of total USD transfer value. This is a strong argument against treating multi-chain tokenisation as one unified infrastructure. From a user-cost perspective, the chain choice materially changes the economics of transfer.

3.4 Servicing

The servicing stage is where the theoretical promise of programmability is strongest, but the observed practical gains are more limited. Ondo explains that its tokenised stocks are total-return trackers. This means the token is designed to reflect not only price changes in the underlying stock, but also dividend effects net of applicable withholding taxes, with value carried through the token structure rather than distributed as direct shareholder cash flow (Ondo Finance, n.d.). The prospectus follows the same economic logic through attributable income, retained dividends, and redemption-value calculations rather than direct shareholder distributions or voting participation (Ondo Global Markets (BVI) Limited, 2025). For the investor, servicing is therefore simplified in one sense: the economic exposure is maintained automatically within the instrument. At the same time, the investor gives up the direct legal rights that normally accompany stock ownership.

This design is efficient for standardisation, but less transformative for corporate governance or investor empowerment. Because the holder does not receive direct voting rights, direct dividend rights, or other issuer-level participation rights, the tokenised structure optimises economic tracking rather than ownership governance (Ondo Global Markets (BVI) Limited, 2025). In that respect, servicing efficiency is selective. The model can reduce some administrative complexity for end users, but it does not create a richer rights architecture than traditional sharing. Rather, it narrows the user experience to a cleaner financial exposure claim. This is more familiar to the ETFs and structured products, which do not provide voting rights. Suggesting that their tokenised versions exhibit the above-mentioned characteristics of tokenised stocks and have greater potential for efficiency gains.

The on-chain evidence also shows that the servicing and post-issuance utility of NVDAon remains relatively shallow, beyond simple transfers and liquidity-pool usage. Publicly confirmed DeFi use is concentrated mainly in DEX liquidity pools on Ethereum, BNB Chain, and Solana, with no strong evidence of broad collateral integration or protocol-native yield use in this research phase. The visible pools are economically small. For example, the main observed Ethereum NVDAon/USDC venue had TVL of about USD 25.8 thousand, the main BNB Chain pool around USD 7.5 thousand, and the identified Solana venues below USD 5 thousand each at the observation date. This is not negligible, but it is too limited to support a claim that tokenised equities have already become deeply embedded in DeFi financial systems. At the same time, with the rapid development of the crypto sector, it is only a matter of time before collateralization is available for Ondo's tokens, as it already is for the direct competitor.

3.5 Redemption

Redemption is one of the most important areas for evaluating whether tokenisation really improves investor exit. Ondo presents redemptions as part of a controlled primary-market mechanism rather than as an automatic blockchain feature. The platform documentation explains that minting and redemption operate through the issuer's infrastructure, while the prospectus states that purchasers can submit a redemption order or exercise a purchaser put option, subject to suspensions, pauses, KYC and AML review, and the issuer's right to reject redemptions where material issues arise (Ondo Finance, n.d.; Ondo Global Markets (BVI) Limited, 2025). This means redemption exists, but it is conditional and institutionally governed.

Theoretically, this structure still offers an improvement over pure secondary-market dependence, because it creates a formal exit channel linked to the issuer rather than requiring the investor to rely only on market depth in a DEX pool. However, the presence of the secondary market with instant settlement brings a great opportunity for liquidity management. The same opportunity also brings new risks of rapid, uncontrolled redemptions during the crisis, even though, based on DeFi analysis, liquidity pools remain not material. The prospectus even allows purchasers to redeem at any time, subject to the relevant terms and permitted pauses, and ties settlement to a redemption amount that reflects the underlying value less applicable fees and adjustments (Ondo Global Markets (BVI) Limited, 2025). However, the practical strength of this mechanism should not be overstated. The same document makes clear that the issuer can pause issuance or redemption, that redemptions remain subject to compliance checks, and that the investor bears issuer risk and limited-recourse risk. Additionally, some liquidity pool providers, like Jupiter for Solana, enable swaps only during the token's trading hours, showing that even decentralised venues can incorporate features of the initial platform to mitigate risks[6]. As a result, the exit channel is not equivalent to holding the underlying share directly through a conventional broker.

The legal protection mechanism in redemption is also more complex than it first appears. On the one hand, the structure includes collateralization and a first-priority security interest held by a security agent for the benefit of tokenholders, which strengthens the formal protection architecture (Ondo Finance, n.d.; Ondo Global Markets (BVI) Limited, 2025). On the other hand, the prospectus also states that enforcement depends on the security agent, that tokenholders are subject to non-petition rules, and that operational and jurisdictional difficulties may weaken the practical realisation of collateral rights in stress events (Ondo Global Markets (BVI) Limited, 2025). Thus, the redemption framework reduces some counterparty exposure relative to an unsecured synthetic token, but it does not eliminate the risk of legal enforcement.

This is relevant for the dissertation framework. The literature often suggests that tokenisation could improve redemption and settlement efficiency by reducing reconciliation frictions and shortening the path from asset sale to investor proceeds. The NVDAon case supports this argument only partially. Redemption is structurally faster and more programmable than many traditional cross-border arrangements, but it remains dependent on institutional verification, issuer discretion, off-chain collateral processes, and the broader functionality of the issuer's operational stack. The result is not full disintermediation but a more compressed, technologically mediated intermediation chain.

[6] Jupiter was used as an example of decentralised exchange infrastructure on the Solana blockchain. The platform aggregates liquidity across Solana-based decentralised exchanges and enables token swaps through available liquidity routes. In this thesis, it is mentioned only as an example of secondary-market swap infrastructure, not as the main source of price data. Source: https://jup.ag/

Robustness and Limitations

The findings of this dissertation are robust in the sense that they are supported by several types of evidence, but they should be interpreted as case-study evidence rather than as a general statistical test of all tokenised equities. The strongest part of the quantitative analysis is the combination of trading data and on-chain data. The trading analysis compares NVDAon with its underlying NVIDIA stock across daily, hourly, and window-based observations. The daily robustness appendix supports the main interpretation: average daily price deviation remains close to zero under both raw-close and adjusted-close comparison. The mean daily deviation is 0.0513% using raw stock close and 0.0600% using adjusted stock close, while the median remains close to zero in both cases. This means that the conclusion of broad daily tracking is not driven by a dividend-adjustment choice. For NVIDIA specifically, dividend effects are economically small over the observed period, as the average difference between adjusted-close and raw-close deviations is only 0.0087 percentage points, and the maximum absolute difference is 0.0169 percentage points.

Next, the hourly stock benchmark uses Yahoo Finance's hourly close prices, not an adjusted hourly stock series, because a reliable adjusted hourly series is unavailable. The adjusted-close robustness test is therefore daily, not intraday. Second, token prices are taken from CoinGecko token-level market prices. They are useful for empirical comparison, but they are not necessarily the executable quote that an investor would receive from Ondo or a secondary venue. Third, the stock reference price is forward-filled outside U.S. regular trading hours. This is necessary for comparison because the underlying cash equity market is closed, but it also means that overnight and weekend deviations partly reflect the artificial stability of the stock benchmark. This does not invalidate the analysis, but it limits the interpretation. The results measure token movement relative to the last available stock reference price; they do not prove that the token price is more informative than the next stock-market opening price.

The on-chain evidence has the following limitations. First, the three chains are not observed at the same stage of development. Ethereum is active from the start of the sample, BNB Chain begins later, and Solana appears only from mid-January 2026. Direct comparison of total activity can therefore confuse chain maturity with user preference. Second, USD transfer values are approximate because they are calculated by backward matching token prices to transaction timestamps. This is necessary for standardisation, but it is not the same as observing the exact execution price of each transfer. Third, transfer data does not reveal economic intent. A transfer can be a user movement, a market-maker movement, a bridge-related operation, a treasury action, or a secondary-market transaction. For this reason, transaction count and volume should be interpreted as observed on-chain activity, not as direct proof of organic investor adoption.

The qualitative case-study robustness is solid but limited to the official source types: the prospectus and official Ondo documentation. This was chosen deliberately because legal and operational claims cannot be tested solely with market data. The prospectus is particularly important for questions of ownership, redemption, transfer restrictions, issuer risk, collateral structure, and investor rights (Ondo Global Markets (BVI) Limited, 2025). However, qualitative evidence also has limits. Issuer documentation describes the product from the platform's perspective and may change as the product evolves. The analysis is not a legal opinion and should not be interpreted as a definitive assessment of enforceability in all jurisdictions. It identifies the economic meaning of the structure for the dissertation, not the final legal outcome.

The broader limitation is that this dissertation studies NVDAon as one concrete case. This is appropriate because tokenised equities are still emerging, data access is limited, and the case allows a detailed link between product structure, trading behaviour, and on-chain activity. Still, the results should not be generalised mechanically to all tokenised stocks, all Ondo products, or all RWA tokenisation models. NVIDIA is a highly liquid and highly visible underlying stock, which may make tracking easier than for less liquid assets. The study period from 01/09/2025 to 28/02/2026 is also relatively short and captures an early stage of product development. The findings therefore support analytical conclusions about one important tokenised equity example, but not universal claims about the sector as a whole.

Economic and Policy Implications

The first economic implication is that tokenisation creates a real efficiency gain, but the gain is narrower than the strongest market narratives suggest. NVDAon improves trading access because the token can move and reprice outside standard U.S. stock-market hours. This is valuable for investors who want exposure when the underlying market is closed. However, the evidence does not show that this access produces more accurate pricing. The hourly and window-based results indicate that the token can diverge from the underlying stock, especially during periods when the cash equity market is closed. Therefore, the economic value of tokenisation in this case is mainly flexibility and immediacy, not proven superior price discovery.

The second implication is that tokenisation shifts transaction costs rather than eliminating them. In traditional finance, costs are visible through brokerage, custody, clearing, settlement, and fund-administration channels. In the NVDAon structure, part of the cost is reflected in quotes, spreads, issuer fees, venue fees, and blockchain gas fees. This matters because investors may perceive tokenised products as cheaper simply because their cost structures appear different. The evidence from on-chain fees shows that the choice of infrastructure materially affects user costs. Ethereum has a median gas fee of about USD 1.3492, BNB Chain about USD 0.0238, and Solana about USD 0.0010. This means that the same token exposure has different transaction economics across chains. Tokenisation, therefore, does not create one uniform cost environment; it creates chain-specific cost regimes.

The third implication is that a token can be portable across networks while its real market depth remains concentrated on one chain. For issuers, this means that chain selection is not only a technical decision. It affects liquidity, transaction size, user cost, and the type of activity that develops around the token. For investors, it means that the best chain for holding or transferring a token may not be the same as the best chain for liquidity or redemption access. As a result, in the future, the chain choice will potentially be subject to available liquidity and profitable DeFi options. The investors’ choice should be made based on their needs, such as fast, low-cost transactions on Solana, the largest and most high-potential DeFi infrastructure on Ethereum. BSC also appears to benefit from centralised-exchange-related activity and a different cost structure, which may explain its larger transfer sizes.

The fourth implication concerns democratisation. The NVDAon case does not support a strong democratisation claim. The product may lower technical and denomination barriers, but primary access remains restricted by jurisdiction, investor eligibility, and compliance checks. This distinction is important for policy discussion. Tokenisation can improve operational access without improving legal access. A wallet-based product is not automatically open to retail investors if the issuer limits who can mint, redeem, or hold the token. Therefore, policymakers should separate technological accessibility from regulatory accessibility. Without this distinction, tokenised equities may be wrongly presented as inclusive products even when they remain designed mainly for qualified or professional participants.

The fifth implication is that investor protection should focus on the difference between economic exposure and legal ownership. NVDAon provides economic exposure to NVIDIA, including the relevant dividend economics, but it does not give direct ownership of NVIDIA shares or direct shareholder rights. It determines voting rights, dividend treatment, redemption claims, insolvency exposure, and the investor's relationship to the issuer. Policy should therefore require clear disclosure that distinguishes direct share ownership, tokenised economic exposure, collateral rights, and redemption rights. This is especially important for retail-facing or secondary-market distribution, where investors may misunderstand a tokenised stock as the same as a broker-held share. Additionally, it will help improve the classification of tokenised assets in accounting balance sheets and tax obligations.

The sixth implication is that regulation should not focus only on the token contract. The main risks are distributed across the full architecture: the SPV, custodians, broker-dealers, tokenisation provider, security agent, price sources, blockchain networks, bridges, and secondary venues. If regulation focuses only on the blockchain layer, it misses the main points where legal and operational failure can occur. The policy problem is therefore not simply whether the smart contract works. It is whether the full chain from underlying asset custody to token issuance, trading, servicing, and redemption is transparent, enforceable, and resilient. This supports the literature view that tokenised RWAs require a lifecycle-based regulatory approach rather than a narrow crypto-asset approach (IOSCO, 2025; FSB, 2024).

The seventh implication concerns redemption and liquidity management. Tokenised equities may trade or transfer outside the hours of the underlying market, but the issuer's ability to hedge, value, or redeem the product still depends on traditional market infrastructure. This creates a possible mismatch between token-market immediacy and underlying-market liquidity. The NVDAon evidence does not show a crisis, but the structure makes the risk visible. If investors expect continuous liquidity while the underlying asset can be traded only during limited sessions, stress periods may lead to wider discounts, delayed redemptions, or stronger issuer controls. Policy should therefore require transparent rules for market pauses, redemption limits, quote validity, and treatment of market disruption. Additionally, with the help of programmability, it is possible to implement new policy regulations or restrictions, as seen in the secondary market example that follows the 24/5 trading hours and blocks swaps via a liquidity pool aggregator.

The eighth implication is that on-chain transparency is useful but incomplete. The analysis could observe transfers, mint and burn events, gas fees, and chain-level activity. This is a clear advantage over purely private-market infrastructure. However, the same data cannot identify the full economic intent of transfers. Without address labels, transaction decoding, and bridge or market-maker classification, it is not possible to separate user adoption from operational movements. Regulators and researchers should therefore avoid treating raw transaction counts as direct evidence of investor demand. Better reporting standards are needed, including issuer-controlled labels for treasury, bridge, market-making, and redemption addresses, while still protecting legitimate privacy.

Conclusions

This dissertation examined tokenisation of real-world assets as an infrastructure innovation rather than only as a new financial product. The main objective was to assess whether tokenisation reduces market frictions across the asset lifecycle, or whether it mainly transforms existing frictions into new legal, liquidity, and infrastructure-related constraints. The literature review showed that tokenisation can improve financial market processes through shared ledgers, programmability, and faster transfer mechanisms. These features can reduce reconciliation costs, support automated settlement, improve asset mobility, and make some financial instruments more divisible and transferable. However, the same literature also showed that these gains are conditional. Tokenised real-world assets still depend on legal wrappers, custody structures, settlement assets, investor eligibility rules, and the liquidity of the underlying asset. Therefore, the thesis did not treat tokenisation as automatically efficient. It evaluated the conditions under which efficiency gains are actually observable.

The NVDAon case study confirms this conditional view. The case combines a liquid traditional underlying asset, NVIDIA stock, with a tokenised equity structure that can be observed through both market prices and blockchain transactions. The analysis shows that tokenisation creates real operational advantages, especially in trading flexibility and on-chain transferability. At the same time, it does not remove the main institutional foundations of the traditional market. The token is not a direct NVIDIA share. It is a tokenised economic exposure issued through a structured legal and operational framework. This distinction is central to the whole dissertation because it shows that tokenisation can modernise market access while preserving important forms of intermediation.

In the current work, the main research question asked how far the tokenised equity structure reduces market frictions across trading and post-issuance activity relative to the theoretical efficiency gains described in the tokenisation literature. NVDAon reduces some frictions, mainly those related to trading time, transferability, and blockchain-based observability. It allows the token to move and reprice outside the normal trading hours of the underlying stock market, and it creates an on-chain record of transfers, minting, burning, and gas costs. However, the case does not show full lifecycle efficiency. Pricing frictions remain visible, primary access is restricted, redemption is controlled by the issuer, and activity is fragmented across chains. Therefore, NVDAon does not prove that tokenisation eliminates market frictions. It shows that tokenisation changes where those frictions appear.

The first sub-question asked whether NVDAon maintains price alignment with NVIDIA stock during regular trading hours, overnight periods, and weekends, and what this implies for exchange-stage efficiency. The evidence shows that price alignment exists on average, but not at every execution point. At the daily level, NVDAon tracks NVIDIA reasonably closely. The mean daily deviation is small under both raw-close and adjusted-close comparison, and dividend adjustments do not materially change the result for the observed period. At the hourly level, however, the picture is less stable. The mean hourly deviation is 0.0695%, and the median is 0.0231%, but the range extends from -4.3454% to 6.6104%, and 18.29% of hourly observations have an absolute deviation above 1%. This means that average tracking does not guarantee execution-level accuracy.

Window analysis gives the strongest answer to the trading question. Overnight windows show that NVDAon continues to reprice when the underlying cash equity market is closed, and the average token-minus-stock return gap is positive at 0.3185 percentage points. During regular trading hours, the pattern partly reverses, with an average gap of -0.2026 percentage points, suggesting partial correction once the stock market reopens. Weekend windows do not show a clear efficiency advantage. The conclusion is therefore specific: tokenisation improves temporal access, but it does not prove superior price efficiency. The token can incorporate information or liquidity pressure outside stock-market hours, but this can also create temporary deviations that later narrow. In exchange-stage terms, tokenisation reduces the friction of market closure, but it does not fully remove pricing frictions.

The second sub-question asked how NVDAon activity is distributed across Ethereum, BNB Chain, and Solana, and what this reveals about liquidity fragmentation and infrastructure efficiency. The on-chain evidence shows a clearly asymmetric market. The full sample contains 801,514 transfers, but the distribution is not balanced. BNB Chain is the dominant venue with 454,223 transfers and 80.44% of total USD transfer value. Ethereum has 335,258 transfers, but only 16.25% of the USD value. Solana has only 12,033 transfers and 3.31% of USD value. This means that multi-chain availability should not be interpreted as integrated liquidity. The token exists across chains, but economic activity is concentrated on a few. The chain-level metrics also show that each blockchain has a different activity profile. Ethereum has a median transfer value of USD 99.82 and a high median gas fee of USD 1.3492. BNB Chain has a much higher median transfer value of USD 399.70 and a much lower median gas fee of USD 0.0238. Solana has a very low median transfer value of USD 9.97 and a median gas fee of about USD 0.0010, but its activity is small and late in the sample. Transaction buckets support the same interpretation: 33.10% of BNB Chain transfers are large, compared with 5.64% on Ethereum and 0.98% on Solana. The result is not that one chain is simply better than another. The result is that the same token behaves differently across infrastructures. BNB Chain appears to be the main economic venue, Ethereum remains active but costly, and Solana is low-cost but not yet widely used. This supports the literature concern that tokenisation can replace one form of fragmentation with another.

The third sub-question asked whether the legal and operational design of Ondo supports or weakens the claims of disintermediation, democratised access, and lower lifecycle frictions. The case weakens the strongest version of these claims. NVDAon does not remove intermediaries. It reorganises them. The product depends on the issuer, legal wrapper, custody arrangements, security structure, compliance controls, price sources, blockchain networks, and redemption rules. The investor does not hold direct legal ownership of NVIDIA shares. The investor holds a tokenised economic claim. This limits the interpretation of tokenisation as direct equity ownership. The democratisation claim is also limited. Tokenisation can lower technical barriers through wallet-based holding, fractional exposure, and on-chain transferability. However, in the NVDAon case, primary access remains restricted by jurisdiction, investor eligibility, and KYC/AML requirements. This means that technological accessibility is not the same as legal accessibility. The case therefore supports a narrower conclusion: tokenisation can make exposure more operationally flexible for eligible users, but it does not automatically democratise access to the underlying asset. Lower lifecycle frictions are present only in selected parts of the process, especially transferability and user-facing settlement. They are weaker in legal ownership, redemption, and investor protection.

The fourth sub-question asked whether NVDAon mainly removes existing frictions or transforms them into new constraints. The evidence supports the second interpretation. Some frictions are reduced: the token is easier to transfer, can be traded over extended periods, and produces on-chain data that is observable. However, new or persistent constraints remain: intraday price dislocation, chain-specific liquidity, issuer dependence, restricted access, legal complexity, and incomplete interpretation of on-chain transfers. The transaction-cost structure also changes rather than disappears. In addition to traditional brokerage, custody, clearing, and settlement costs, the investor faces quote-based costs, spreads, venue fees, gas fees, and chain-specific liquidity conditions. Therefore, tokenisation does not remove frictions in a simple way. It redistributes them across legal, technological, and market layers.

The economic implication is that tokenisation should be treated as an infrastructure reform with selective efficiency gains. The NVDAon case shows that tokenised equities can improve access to economic exposure and make it more portable. It also shows that these benefits depend on the design of the surrounding infrastructure. If liquidity is concentrated on one chain, if redemption is controlled by the issuer, if the token price can diverge from the stock, and if investors do not hold direct shareholder rights, then the economic effect is not equivalent to simply holding the underlying share in a more efficient form. The policy implication is that regulation should focus on the full lifecycle architecture, not only on the token contract. Ownership disclosure, collateral verification, redemption rules, market disruption procedures, settlement assets, and on-chain reporting standards are all important for making tokenisation both useful and safe.

The final conclusion is that tokenisation of real-world assets is neither automatically efficient nor merely speculative or irrelevant. In the NVDAon case, tokenisation creates measurable benefits when the objective is broader trading access, on-chain transferability, and more transparent observation of activity. However, these benefits are limited when the objective is perfect price alignment, full disintermediation, open democratised access, or uniform multi-chain liquidity. The net benefit of tokenisation depends on the balance between operational gains and the externalities created by legal wrappers, fragmented liquidity, issuer dependence, and hybrid infrastructure. For this dissertation, the central finding is that tokenisation does not abolish financial intermediation. It changes its form. Its value will be strongest where legal rights are clear, collateral and redemption are transparent, liquidity is deep enough, and the technology is integrated with market infrastructure in a way that reduces frictions without hiding new risks.

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Appendix A – Sample of NVDA/NVDAon Trading Analysis Dataset

Table A1. Regular-hours sample from the NVDA/NVDAon trading window dataset

window_start_utc	window_end_utc	stock_simple_return	token_simple_return	price_dev_start_pct	price_dev_end_pct
2025-09-02T13:30:00Z	2025-09-02T20:00:00Z	-0.0022	-0.0033	0.5606	0.4575
2025-09-03T13:30:00Z	2025-09-03T20:00:00Z	-0.0056	-0.0074	-0.1571	-0.3359
2025-09-04T13:30:00Z	2025-09-04T20:00:00Z	0.0039	0.0063	-0.3955	-0.1621
2025-09-05T13:30:00Z	2025-09-05T20:00:00Z	0.0101	-0.0063	1.6468	-0.0011

Source: Own processing of Yahoo Finance and CoinGecko data. Returns and deviations are rounded to four decimals for display.

Table A2. Overnight sample from the NVDA/NVDAon trading window dataset

window_start_utc	window_end_utc	stock_simple_return	token_simple_return	price_dev_start_pct	price_dev_end_pct
2025-09-02T20:00:00Z	2025-09-03T13:30:00Z	0.0065	0.0003	0.4575	-0.1571
2025-09-03T20:00:00Z	2025-09-04T13:30:00Z	0.0028	0.0022	-0.3359	-0.3955
2025-09-04T20:00:00Z	2025-09-05T13:30:00Z	-0.0373	-0.0198	-0.1621	1.6468

2025-09-08T20:00:00Z	2025-09-09T13:30:00Z	-0.0003	-0.0009	0.1739	0.1112

Source: Own processing of Yahoo Finance and CoinGecko data. Returns and deviations are rounded to four decimals for display.

Table A3. Weekend sample from the NVDA/NVDAon trading window dataset

window_start_utc	window_end_utc	stock_simple_return	token_simple_return	price_dev_start_pct	price_dev_end_pct
2025-09-05T20:00:00Z	2025-09-08T13:30:00Z	0.0207	0.0187	-0.0011	-0.2011
2025-09-12T20:00:00Z	2025-09-15T13:30:00Z	-0.0128	-0.0117	0.0237	0.1411
2025-09-19T20:00:00Z	2025-09-22T13:30:00Z	-0.0057	-0.0052	0.2379	0.2879
2025-09-26T20:00:00Z	2025-09-29T13:30:00Z	0.0308	0.0321	-0.1024	0.0220

Source: Own processing of Yahoo Finance and CoinGecko data. Returns and deviations are rounded to four decimals for display.

Appendix B – Sample of NVDAon Transaction-Level On-Chain Dataset

Table B1. Ethereum sample from the standardised NVDAon on-chain dataset

timestamp_utc	tx_hash	from_address	to_address	amount_token_units	event_type	token_price_usd	txn_gas_fee_usd	amount_usd	txn_bucket
2025-09-02T14:59:11Z	0xa0b107...602e32	0x000000...000000	0xf81377...c480b3	0.0389	mint	171.5902	4.5965	6.6668	small
2025-09-02T14:32:11Z	0xdae6a6...5ffa11	0x6fa945...592198	0x2c158b...4c5c8c	1.6824	transfer	171.5902	2.0585	288.6848	medium
2025-09-02T14:32:11Z	0xdae6a6...5ffa11	0x2c158b...4c5c8c	0x000000...000000	1.6824	burn	171.5902	2.0585	288.6848	medium
2025-09-02T17:39:59Z	0xcca929...0f5c06	0x000000...000000	0x268dfd...9cb343	8.8841	mint	168.6273	5.8756	1498.1098	large

Source: Own processing of Etherscan, BscScan, Solscan, and CoinGecko data. Numeric values are rounded to four decimals for display.

Table B2. BNB Chain sample from the standardised NVDAon on-chain dataset

timestamp_utc	tx_hash	from_address	to_address	amount_token_units	event_type	token_price_usd	txn_gas_fee_usd	amount_usd	txn_bucket
2025-10-20T01:21:09Z	0x0438a0...b4e77e	0x000000...000000	0xdb6342...76c878	0.0109	mint	183.7121	0.0278	1.9971	small

2025-10-22T09:51:14Z	0xcdc334...6999ae	0xde683a...b897ae	0x9008d1...60ab41	0.2926	transfer	181.3525	0.0434	53.0688	small
2025-10-22T10:37:26Z	0xbb4d36...c0ec3a	0x91f8af...bdb299	0x000000...000000	0.2923	burn	181.1501	0.0412	52.9560	small
2025-10-29T18:23:19Z	0x27f491...5e1eaf	0x000000...000000	0xde683a...b897ae	5.7235	mint	207.8652	0.0806	1189.7091	large

Source: Own processing of Etherscan, BscScan, Solscan, and CoinGecko data. Numeric values are rounded to four decimals for display.

Table B3. Solana sample from the standardised NVDAon on-chain dataset

timestamp_utc	tx_hash	from_address	to_address	amount_token_units	event_type	token_price_usd	txn_gas_fee_usd	amount_usd	txn_bucket
2026-01-14T14:59:28Z	3WW8G3As...TVtuoU	Unknown	2Cq2RNFF...FvoN9m	0.2197	mint	184.4875	0.0014	40.5330	small
2026-01-14T14:59:28Z	3KKVgnXX...J9gbnV	2Cq2RNFF...FvoN9m	onANiutG...WeVuaf	0.2196	transfer	184.4875	0.0017	40.5103	small
2026-01-14T14:59:32Z	Ew6YtSQw...kSyt7M	2Cq2RNFF...FvoN9m	Unknown	0.2196	burn	184.4875	0.0014	40.5103	small
2026-01-21T08:34:15Z	2SPzfFDy...Jo6JMS	Unknown	2Cq2RNFF...FvoN9m	27.5650	mint	179.7880	0.0013	4955.8631	large

Source: Own processing of Etherscan, BscScan, Solscan, and CoinGecko data. Numeric values are rounded to four decimals for display.