International Economics
& Development Laboratory

WORKING
PAPER

No. 8 | November 2025

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Working Paper

International Economics and Development Laboratory (IEDL), University of Athens, Greece

November 4, 2025

ABSTRACT

This paper examines how housing tokenization is discursively framed in Chile's digital public sphere, assessing whether it promotes affordability or reinforces financialization. Using a methodology that combines natural language processing, topic modeling, sentiment analysis, and semantic network analysis, the study analyzes content from 34 websites—including fintech startups, media outlets, and real estate firms—scraped and processed in R. Results show that tokenization is largely portrayed through a techno-optimistic lens focused on investment, trust, and digital innovation. Sentiment analysis highlights dominant emotional tones of "trust" and "anticipation," while topic modeling identifies four themes: return performance, platform ecosystems, asset commodification, and user empowerment. These narratives, however, tend to obscure critical perspectives on equity and governance. Despite limitations related to data bias and cultural nuance, the study offers a replicable method for analyzing technological discourses and raises important questions about the policy implications of financial innovation in emerging markets.

Keywords: financial innovation, blockchain, real estate, token, financialization.

JEL: G23, R31, O33, O16.

1. Introduction

Real estate tokenization via blockchain signifies a shift in housing finance by transforming traditional capital allocation through distributed ledger technology. Blockchain—decentralized, transparent, and immutable—allows property assets to be digitally represented as cryptographic tokens, promoting liquidity, transparency, and broader access to investment opportunities historically limited to institutional and affluent investors (Baum, 2021; Swinkels, 2023). By enabling fractional ownership, tokenization lowers entry barriers, encourages secondary market trading, and offers SMEs and retail investors new avenues into high-cost property markets (Baum, 2021; Popov et al., 2022; Proskurovska, 2023). This restructuring of ownership challenges the conventional view of real estate as a static, high-commitment asset and redefines its accessibility and exchangeability. Tokenization also resonates with broader financial paradigms. In Islamic finance, it aligns with Shariah principles by enhancing transparency, discouraging speculation, and promoting equitable risk-sharing (Khan et al., 2020). In sustainable finance, it fosters investment in socially and environmentally responsible projects by enabling transparent, impact-focused asset classes (Chiu & Greene, 2019). Thus, tokenization is not merely a technical innovation—it embodies shifting societal expectations around ethical finance, inclusivity, and sustainability, linking economic mechanisms to normative frameworks and long-term developmental goals.

Despite its advantages, real estate tokenization faces regulatory, technological, and institutional hurdles. Regulatory uncertainty, fragmented jurisdictions, and the absence of international blockchain standards complicate compliance and increase legal risk (Baum, 2021; Gürcan Avci & Erzurumlu, 2023). Technologically, tokenization depends on complex intermediaries—custodians, exchanges, and market makers—which introduce operational risks and hinder seamless integration (Baum, 2021; Proskurovska, 2023). Adoption thus requires regulatory clarity and investment in infrastructure and institutional capacity.

Yet, evidence highlights blockchain's potential to transform real estate processes like property registration, conveyancing, and mortgage issuance, making them more secure, efficient, and cost-effective (Nasarre-Aznar, 2018; Saari et al., 2022; Proskurovska, 2023). Analytical models suggest tokenization

may broaden investor participation and stimulate market growth through enhanced liquidity and lower transaction risks (Popov et al., 2022). As the technology matures, tokenization could restructure housing finance, enabling more inclusive and dynamic property markets while challenging entrenched practices.

The discourse on real estate tokenization becomes more intricate when situated within global financial ecosystems. Its capacity to enable cross-border capital flows and embed local markets within transnational financial circuits signals both promise and peril (Böhmecke-Schwafert, 2024; Mosin, 2023; Nassr, 2020). Cases in Australia, South Korea, and Singapore affirm its viability while raising concerns about macroeconomic stability and national sovereignty (Chow & Tan, 2021; Kasprzak, 2021). Tokenized assets may hedge against inflation and currency volatility, yet may also heighten exposure to global financial shocks.

Parallel debates highlight tokenization's potential to redress structural inequities in housing finance, particularly by enhancing access for lower-income groups historically excluded from formal markets (Grubbauer, 2019; Rosylin Mohd Yusof et al., 2023). Nonetheless, scholars urge robust macroprudential regulation—such as loan-to-value limits and capital buffers—to mitigate new risks (Carrasco-Gallego, 2020). Denmark's mortgage reforms exemplify how integrating housing finance into global markets can align with macroeconomic goals (Wood, 2018).

Tokenization also intersects with the redefinition of housing and climate resilience as global public goods (Khan & Munira, 2021; Tan, 2022). This opens pathways for innovative financing, but critical literature warns that unchecked financialization, especially through privatized platforms, may restrict public policy capacity and entrench inequality (Tan, 2022; Wainwright & Manville, 2017). Thus, while tokenization offers transformative potential, its governance must be calibrated to prevent reinforcing the very disparities it aims to overcome (Proskurovska, 2023).

This paper critically explores how real estate tokenization is discursively constructed within Chile's digital ecosystem, emphasizing implications for housing markets in the Global South. By analyzing publicly disseminated

narratives from fintech platforms, websites, and media outlets, the research evaluates whether tokenization substantively enhances housing accessibility or predominantly advances speculative financial practices. The central question investigates tokenization's actual contribution to affordability in emerging markets or if it mainly supports speculative interests.

Utilizing a multi-method framework comprising natural language processing, discourse analysis, and semantic network modeling, the study analyzes empirical data scraped from 34 Chilean digital sources, including startups, media, and real estate websites. Methods encompass frequency-based term extraction, sentiment analysis with the NRC lexicon, topic modeling via Latent Dirichlet Allocation, and semantic co-occurrence networks created using R. Findings demonstrate that tokenization discourse primarily emphasizes investment returns, trust-building, and digital innovation. Sentiment analysis identifies dominant emotions of trust and anticipation, while topic modeling outlines four central themes: financial performance, token platform ecosystems, asset commodification, and user empowerment. Consequently, the results highlight concerns regarding the potential depoliticization and commodification of housing under the banner of technological innovation.

1.1. Tokens and blockchains

Since its inception with Bitcoin in 2008, blockchain technology has undergone significant conceptual, technical, and institutional transformations. Initially designed as a peer-to-peer electronic cash system in response to the 2008 global financial crisis, Bitcoin's underlying technology—blockchain—has since catalyzed a broader reimagining of financial systems, economic relationships, and governance structures (Paulavičius et al., 2019; Ramadoss, 2022). The original promise of a decentralized, disintermediated, and transparent infrastructure has grown into an ecosystem of programmable money, smart contracts, and decentralized finance (DeFi), expanding its reach well beyond the monetary functions it was first designed to challenge (Lacity, 2022; Tripathi et al., 2023).

The evolution of blockchain has been characterized by three overlapping stages. The first was the age of cryptocurrencies, where the focus remained on digital currencies like Bitcoin and Ethereum as alternative stores of value. The second

introduced programmable platforms such as Ethereum, enabling smart contracts and new organizational forms like Decentralized Autonomous Organizations (DAOs). The third, and ongoing, stage involves blockchain's application across various sectors—from logistics and healthcare to urban governance—through solutions like tokenization, identity verification, and transparent supply chains (Ramadoss, 2022; Jaoude & Saadé, 2019). These stages mirror a progressive abstraction of value: from cryptocurrency as digital money to blockchain as an architecture of trust for institutional redesign.

At the core of blockchain's allure lies its key attributes: decentralization, immutability, and transparency (Tripathi et al., 2023; Dong et al., 2023). These features reconfigure how economic trust is organized and enforced, shifting away from state or institutional mediation to algorithmic consensus among distributed nodes. As Xu et al. (2022) note, this distributed ledger technology facilitates a new form of record-keeping where transaction validation is decentralized, theoretically eliminating the need for hierarchical intermediaries. For this reason, blockchain has been interpreted as a potential "trust machine"—a disintermediating force in both public and private sectors (Frolov, 2020).

In terms of economic theory, blockchain challenges conventional assumptions embedded in transaction cost economics and the principal-agent problem. By replacing contractual enforcement with cryptographic consensus and embedding governance rules in code, blockchain promises to reduce opportunism and information asymmetry, particularly in investment, crowdfunding, and startup financing (Ahluwalia et al., 2020). Indeed, DAOs represent a provocative experiment in economic coordination, where code-based governance can ostensibly replace human-led institutions (Bellavitis et al., 2022). However, the promise of algorithmic trust remains conditioned by technical limitations and social externalities.

Across industrial domains, blockchain has been implemented to enhance operational efficiency, reduce fraud, and foster transparency. In logistics and supply chain management, the technology has been analyzed through transaction cost theory and resource-based views to evaluate its capacity for reducing verification costs and improving information flows (Kummer et al., 2020; Chen et al., 2022). Real estate, a traditionally illiquid and opaque market,

has emerged as a salient application field, where tokenization—a process by which physical assets are divided into digital tokens—could revolutionize how property is owned, traded, and financed (Saari et al., 2022; Nowiński & Kozma, 2017). Yet the transition from potential to practice is not guaranteed.

The economic benefits of blockchain are multifaceted. Tokenization can increase liquidity by enabling fractional ownership of assets, making previously inaccessible markets available to smaller investors. In sectors like art, real estate, and venture capital, this has been heralded as a step toward democratizing investment opportunities (Porras-Gonzalez et al., 2019). In public services, blockchain has been proposed as a way to improve efficiency and trust, particularly in land registries, healthcare record-keeping, and even electoral systems (Cagigas et al., 2021; Berenjestanaki et al., 2023). Its immutable ledger and transparent audit trail support accountability in governance structures, while its programmability enables complex logic for automation and conditional transactions.

However, these promises must be balanced against real and persistent challenges. Scalability remains a major hurdle. Current blockchain infrastructures—especially those using proof-of-work (PoW) consensus mechanisms—suffer from low throughput, high latency, and substantial energy consumption (Alshahrani et al., 2023; Khan et al., 2021). Bitcoin's notorious electricity demands have raised sustainability concerns, particularly in light of global climate goals (Cocco et al., 2017). In addition, regulatory uncertainty looms large. The pseudonymous and transnational nature of blockchain transactions complicates compliance with anti-money laundering (AML) and know-your-customer (KYC) requirements, creating potential conduits for illicit financial flows (Yeoh, 2017; Ahl et al., 2022).

Furthermore, the economic volatility of blockchain-based assets—particularly tokens and cryptocurrencies—adds a layer of systemic risk. Without intrinsic value or robust regulatory frameworks, these assets are prone to speculation, pump-and-dump schemes, and liquidity shocks. These dynamics not only threaten investors but can destabilize broader markets, especially when financial institutions become exposed to blockchain-based derivatives (Martino & Ringe, 2025). More subtly, blockchain might reproduce or exacerbate

existing inequalities. While often celebrated as inclusive, its benefits accrue to those with technological access, digital literacy, and capital for initial investment (Thanasi Boçe & Hoxha, 2024).

There are also governance risks. Code-based governance, though efficient, often lacks mechanisms for due process, appeals, or democratic deliberation. In DAOs, voting power is frequently allocated based on token holdings, introducing plutocratic tendencies that contradict the egalitarian discourse of decentralization (Chawla, 2020). Similarly, blockchain applications in real estate could amplify existing housing inequalities if left to speculative market forces. While proponents celebrate tokenization as a democratizing innovation, critics argue that it could intensify the commodification of housing, converting homes into hyper-liquid financial instruments and further severing their social function from their exchange value (Martino & Ringe, 2025).

To move from experimentation to sustainability, blockchain's development must be understood as a political-economic project—one that involves not only technical refinement but also normative orientation. As Lacity (2022) argues, blockchain is not merely a tool but a governance technology that reshapes power relations, institutional architectures, and normative expectations about transparency, autonomy, and value. Addressing blockchain's potential and risks requires interdisciplinary collaboration among technologists, regulators, economists, and social theorists. Policymaking, in particular, must evolve to anticipate the impacts of decentralized technologies and develop frameworks for accountability, sustainability, and inclusivity.

Blockchain economics constitutes a dynamic and contested terrain, marked by simultaneous emancipatory and extractive potentials. While it enables the reconfiguration of value flows and institutional arrangements, it also introduces novel forms of exclusion, volatility, and asymmetry. The trajectory from Bitcoin's libertarian origins to the institutional experimentation of smart contracts and decentralized autonomous organizations (DAOs) signals an incipient transition toward a post-institutional economic order. However, in the absence of rigorous regulatory oversight, empirical scrutiny, and sustained critical inquiry, blockchain risks reproducing, or even intensifying, the very inequalities it purports to disrupt. As blockchain technologies become

increasingly embedded in economic and social infrastructures, their long-term significance will be shaped not only by technical affordances but by the normative frameworks and political imaginaries they inscribe into the architecture of the digital future.

1.2. Housing affordability crisis in Chile

The Chilean housing system has undergone profound transformations since the imposition of neoliberal reforms under the Pinochet dictatorship in the 1980s, inaugurating a shift from housing as a social right to a commodified asset embedded within market logics (Hidalgo Dattwyler et al., 2016). This paradigmatic reorientation not only dismantled previous welfare-state structures but entrenched a subsidiary state model, wherein the government's role became that of enabling access through market-mediated mechanisms such as targeted subsidies. This restructuring led to the relocation of low-income populations to urban peripheries, often in socially fragmented and infrastructurally deprived environments, undermining community networks and perpetuating spatial injustices (Cortés-Urra et al., 2023).

Subsequent democratic governments, despite rhetorical shifts, largely maintained this neoliberal framework, expanding private financial instruments while relying on targeted subsidies as the main tool for housing provision (Pérez, 2017; Hidalgo Dattwyler et al., 2019). Although some recent initiatives have aimed at re-centralising social housing in more integrated urban areas, the overall model continues to generate patterns of peripheralisation and exclusion. Indeed, subsidy-driven housing policy has been critiqued for facilitating the commodification of urban land while fostering indebtedness among vulnerable households (Dattwyler et al., 2022). The resulting socio-spatial structure is one of stark inequality, marked by segregated peripheries, speculative centralities, and increasingly financialised housing markets (Vergara-Perucich & Aguirre-Nuñez, 2019).

This historical backdrop forms the foundation of Chile's current housing affordability crisis, which is not merely a consequence of demographic growth or supply-demand imbalances, but a deeply structural issue rooted in policy choices, institutional frameworks, and the persistent financialisation of housing. Comparative studies reveal that while Chile shares trajectories with other

neoliberal urban regimes globally, its particular combination of subsidiary governance and unregulated private sector dominance constitutes a distinctive and cautionary case (Beswick et al., 2019; Imilan et al., 2016).

Housing financialisation in Chile has deepened in recent years, reflecting a global trend where residential property becomes increasingly entangled with financial circuits. This involves not only the expansion of mortgage debt and securitised financial products, but the broader transformation of housing into a speculative asset class (Fainstein, 2016; Wainwright & Manville, 2017). In Chile, financial institutions have been pivotal actors in reshaping the housing landscape, mediating access through debt, and contributing to the reconfiguration of class distinctions via homeownership and creditworthiness (Hidalgo Dattwyler et al., 2022). The rise of institutional landlords and investment funds operating within the housing sector has further solidified a business-oriented approach to urban development, prioritising returns over residency (Urbina Julio, 2024).

The increasing influence of global capital and monetary policy on Chilean housing prices—illustrated by the role of central banks and foreign stock markets—has rendered the sector highly sensitive to global economic fluctuations (Vergara-Perucich, 2022). In this regard, the financialisation process has not remained confined to the private market, but has also permeated the domain of social housing, shifting its orientation from redistributive logics to economic valuation. Parallel dynamics have been documented across Latin America, where financialisation has impaired efforts toward comprehensive housing governance (Nascimento Neto & Salinas Arreortúa, 2020; Reyes, 2020).

In response to this intensifying crisis, new financial mechanisms are being mobilised, among them the blockchain-based tokenisation of real estate. Tokenisation involves the digital fragmentation of property into tradable units on blockchain platforms, ostensibly lowering barriers to investment and enhancing market liquidity (Baum, 2021; Swinkels, 2023). While these technologies are often presented as tools for democratising real estate access and promoting financial inclusion, their actual effects remain ambiguous and potentially contradictory. In contexts like Chile—where the housing market is

already heavily financialised—the introduction of tokenisation risks exacerbating speculative behaviours and distancing housing even further from its social function (Hidalgo Dattwyler et al., 2022).

The discursive promise of tokenisation lies in its ability to fractionalise ownership and allow small investors to participate in what has traditionally been an exclusive market (Avci & Erzurumlu, 2023). Yet, critical urban scholarship has raised concerns that such mechanisms may simply facilitate a broader integration of local housing markets into volatile global financial systems, accelerating gentrification, and reinforcing exclusionary dynamics (Blakeley, 2020; Wijburg & Waldron, 2020). As housing becomes increasingly conceived not as a dwelling but as a portfolio asset, its price dynamics are driven more by investor sentiment than residential need.

This trend was made particularly visible during the COVID-19 pandemic, which intensified housing insecurity while simultaneously providing a fertile ground for capital innovation. As conventional returns dwindled, real estate emerged as a safe haven for surplus capital, and tokenisation was advanced as a new frontier of accumulation (Blakeley, 2020). In such a scenario, the risk is not simply that housing becomes more expensive, but that its normative foundation as a human right is systematically eroded.

Moreover, the Chilean experience illustrates how state policy itself plays a constitutive role in enabling financialisation. Subsidies have operated as demand-side stimuli that inflate prices while shifting the financial burden to households, reinforcing indebtedness and capital accumulation by real estate firms (Dattwyler et al., 2016). The growing reliance on private equity and foreign capital in affordable housing provision exemplifies how public policy increasingly aligns with market logics, rather than counteracting them. In effect, the housing crisis is not only a crisis of supply or affordability, but of democratic governance over land and housing systems.

As these structural tensions unfold, the question arises: does the tokenisation of housing represent a rupture or merely an intensification of ongoing processes? On one hand, blockchain technologies may improve transparency, reduce transaction costs, and offer new modes of governance through decentralised protocols. On the other hand, they risk amplifying the speculative ethos of

financial capitalism, replacing tangible social infrastructure with dematerialised and depersonalised investment flows.

Therefore, any critical engagement with tokenisation must go beyond the surface-level narratives of efficiency and access. It must interrogate the power dynamics, institutional arrangements, and distributive consequences it entails. The Chilean case reveals how technological innovations in housing finance are never neutral: they are embedded in specific political economies, and their outcomes are shaped by pre-existing inequalities and policy choices. Without careful regulatory oversight and a commitment to housing justice, tokenisation may offer little more than a high-tech version of an old problem—the commodification of the home.

2. Methodology

This study applies an empirical, web-based text mining approach to explore how housing tokenization is discursively framed in Chile. The aim is twofold: first, to investigate the narratives, sentiments, and semantic structures through which tokenized real estate is promoted, normalized, or contested across Chilean digital platforms; and second, to test a replicable method for discursive analysis that captures the dynamics of financial innovation in housing outside institutional or policy-bound sources. Tokenization in the real estate sector, particularly in emerging markets, is often driven by startups, fintech platforms, and media intermediaries, rather than public housing agencies or traditional banks. For this reason, this research privileges data generated from below through websites, digital platforms, and articles that are part of the public-facing ecosystem of housing tokenization. This method allows us to assess not what tokenization is officially defined to be, but what it is *made to mean* in the Chilean context.

2.1. Data Collection

The data corpus consists of 34 URLs associated with Chilean startups, proptech platforms, news articles, fintech incubators, and digital magazines. These were selected based on the following inclusion criteria: (1) relevance to the topic of tokenization or fractional property investment; (2) publication or activity linked to the Chilean real estate market; and (3) accessibility of the web page content via HTML parsing. Web content was extracted using R, specifically through

the rvest, httr, and purrr packages. The following script was used to automate data extraction from each site:

```
# Required packages
library(rvest)
library(httr)
library(purrr)

# List of URLs
urls <- c("https://www.holdo.cl/", "https://www.reity.cl/", ...)

# Extraction function
extract_text_from_url <- function(url) {
  tryCatch({
    page <- read_html(url)
    text <- page %>% html_nodes("p") %>% html_text() %>% paste(collapse =
" ")
    return(text)
  }, error = function€ {
    return(NA)
  })
}

# Apply function
web_texts <- map(urls, extract_text_from_url)

# Create results data frame
results <- data.frame(url = urls, text = web_texts, stringsAsFactors =
FALSE)
```

The extracted texts were saved and transformed into a corpus using the tm and tidytext packages, followed by standard cleaning operations: lowercasing, punctuation removal, stopword filtering.

2.2. Text Mining and Visualisation

The corpus was analyzed using frequency, sentiment, and bigram network analysis. For conducting (i) **term frequency,** a document-term matrix (DTM) was constructed using DocumentTermMatrix(). The most frequent terms revealed recurring keywords associated with investment, access, and technology. (ii) Bigrams were tokenized using *unnest_tokens() with token = "ngrams", n = 2*, followed by filtering out Spanish stopwords. A (iii) semantic network was then constructed from the bigrams using the igraph and ggraph packages to visualize co-occurrence relationships. (iv) Sentiment scores were computed using sentimentr and syuzhet, providing

average polarity scores per document. NRC lexicon was used to detect emotional valences, visualized using bar plots and density curves.

```
library(sentimentr)
sentiment_scores <- sentiment(unlist(web_texts))
sentiment_summary <- sentiment_scores %>%
  group_by(element_id) %>%
  summarize(avg_sentiment = mean(sentiment))
```

This revealed a strongly positive sentiment across most texts, with dominant emotions such as *trust* and *anticipation*, supporting the hypothesis that tokenization is discursively framed as a techno-optimistic, low-risk innovation. To classify the discursive patterns found in the corpus into thematically coherent groups, we applied *Latent Dirichlet Allocation* (LDA), an unsupervised topic modelling method that assumes documents are mixtures of latent topics and that each topic is a distribution over words. This method allows us to infer the dominant themes present in the corpus of Chilean websites related to housing tokenization. We used the *topicmodels* and *tidytext* packages in R to implement LDA. Prior to modelling, the term-document matrix was filtered to remove sparse terms, and document lengths were standardised.

```
# Required packages
library(topicmodels)
library(tidytext)
library(dplyr)

# Prepare DTM for LDA (remove sparse terms)
dtm_filtered <- removeSparseTerms(dtm, 0.98)

# Set number of topics (e.g., 3 to 6)
lda_model <- LDA(dtm_filtered, k = 4, control = list(seed = 1234))

# Extract topics per document
topic_terms <- tidy(lda_model, matrix = "beta")

# Top terms per topic
top_terms <- topic_terms %>%
  group_by(topic) %>%
  top_n(10, beta) %>%
  ungroup() %>%
  arrange(topic, -beta)

# Visualise topics
library(ggplot2)
top_terms %>%
  mutate(term = reorder_within(term, beta, topic)) %>%
  ggplot(aes(term, beta, fill = as.factor(topic))) +
  geom_col(show.legend = FALSE) +
  facet_wrap(~ topic, scales = "free") +
```

```
  coord_flip() +
  scale_x_reordered() +
  labs(title = "Top Terms per Topic",
       x = "Term", y = "Probability")
```

This step allows for a more nuanced understanding of the latent themes animating Chile's tokenization discourse, showing how narratives of accessibility and innovation dominate, while issues of risk, governance, and social consequences are marginalised. The semantic co-occurrence analysis was applied to uncover the latent structure and meaning embedded in the discourse surrounding the tokenization of real estate in Chile. This method operates through a combination of tokenization, co-occurrence frequency calculation, and graph-based network representation. Initially, the textual corpus—extracted from web pages dedicated to housing tokenization—is pre-processed through standard natural language processing (NLP) techniques. Text is converted to lowercase, stripped of punctuation and extra white space, and then transformed into a tidy data frame in which each word becomes a row (following the *tidytext* framework).

The tokens are filtered to exclude stopwords and overly short words, improving semantic relevance. Using the *widyr* package, the script calculates pairwise word co-occurrences within each document. This approach reveals how frequently two words appear in proximity across the corpus, building a matrix of conceptual associations. The co-occurrence data is then filtered to retain only frequently co-occurring pairs (in this case, those with at least 15 co-occurrences), ensuring a focus on meaningful semantic relations. These relationships are then represented as a graph using the *igraph* package, where nodes are individual terms and edges indicate co-occurrence frequency. The graph is visualized using a *Fruchterman-Reingold* layout and enriched with features such as weighted edges, community highlighting, and loop suppression. To enhance accessibility and interpretability for English-speaking audiences, a manual Spanish-to-English dictionary is implemented to translate the vertex labels.

This method offers a replicable, scalable technique for uncovering thematic patterns and relational structures in textual datasets. It is particularly suited to emerging fields where discursive formations—such as "investment",

"platform", "token", or "ownership"—play a critical role in framing technologies, markets, and legitimacy claims.

2.3. Limitations

Several methodological limitations must be acknowledged. First, the analysis is based solely on publicly available digital content, which inherently reflects promotional or editorial biases. Corporate websites and investor platforms are unlikely to present critical perspectives. Second, while sentiment and frequency analysis provide useful insights into tone and emphasis, they do not capture rhetorical nuance, irony, or context-dependent meanings. Third, despite the use of stopword filtering and word cleaning, variations in web formatting and unstructured text can affect consistency in data parsing.

Moreover, the lexical and emotional lexicons employed (such as NRC or Syuzhet) are calibrated primarily for general-purpose or English-language content. Although applied here to Spanish texts, their cultural and linguistic precision is limited, and the results should be interpreted heuristically rather than deterministically.

2.4. Replicability and Usefulness

The method outlined here offers a replicable pipeline for researchers seeking to explore emerging discourses of financial innovation, particularly where institutional data is limited or inaccessible. By combining web scraping with text mining and sentiment analysis in R, it provides a lightweight but rigorous approach to understanding how technological narratives—such as those surrounding tokenization—are constructed and diffused in the public domain. LDA's reliance on word co-occurrence means it is sensitive to vocabulary size, sparsity, and document length. Moreover, topic labels are interpretive constructs rather than statistical outputs, requiring careful qualitative validation.

3. Results

The analysis presented applies a multi-method approach to explore how the tokenization of housing is discursively constructed in the Chilean digital ecosystem. Drawing on a corpus of 34 web-based sources—including startup websites, fintech platforms, media articles, and digital magazines—the study uses web scraping techniques to extract textual content related to real estate

tokenization. It then employs a suite of natural language processing and text mining techniques in R, including term frequency, sentiment analysis, bigram co-occurrence, and topic modeling via Latent Dirichlet Allocation (LDA). These methods are used to identify semantic patterns, dominant narratives, and emotional valences within the discourse. The study also incorporates semantic network analysis to visualize key relationships between terms and a manual translation step to interpret results in English. By focusing on publicly available content rather than institutional or governmental documents, the analysis uncovers a techno-optimistic framing of tokenization that emphasizes innovation and access while largely omitting critiques of speculation and inequality.

Figure 1. Horizontal bar chart of the most frequent terms appearing in the analyzed corpus related to housing tokenization in Chile.

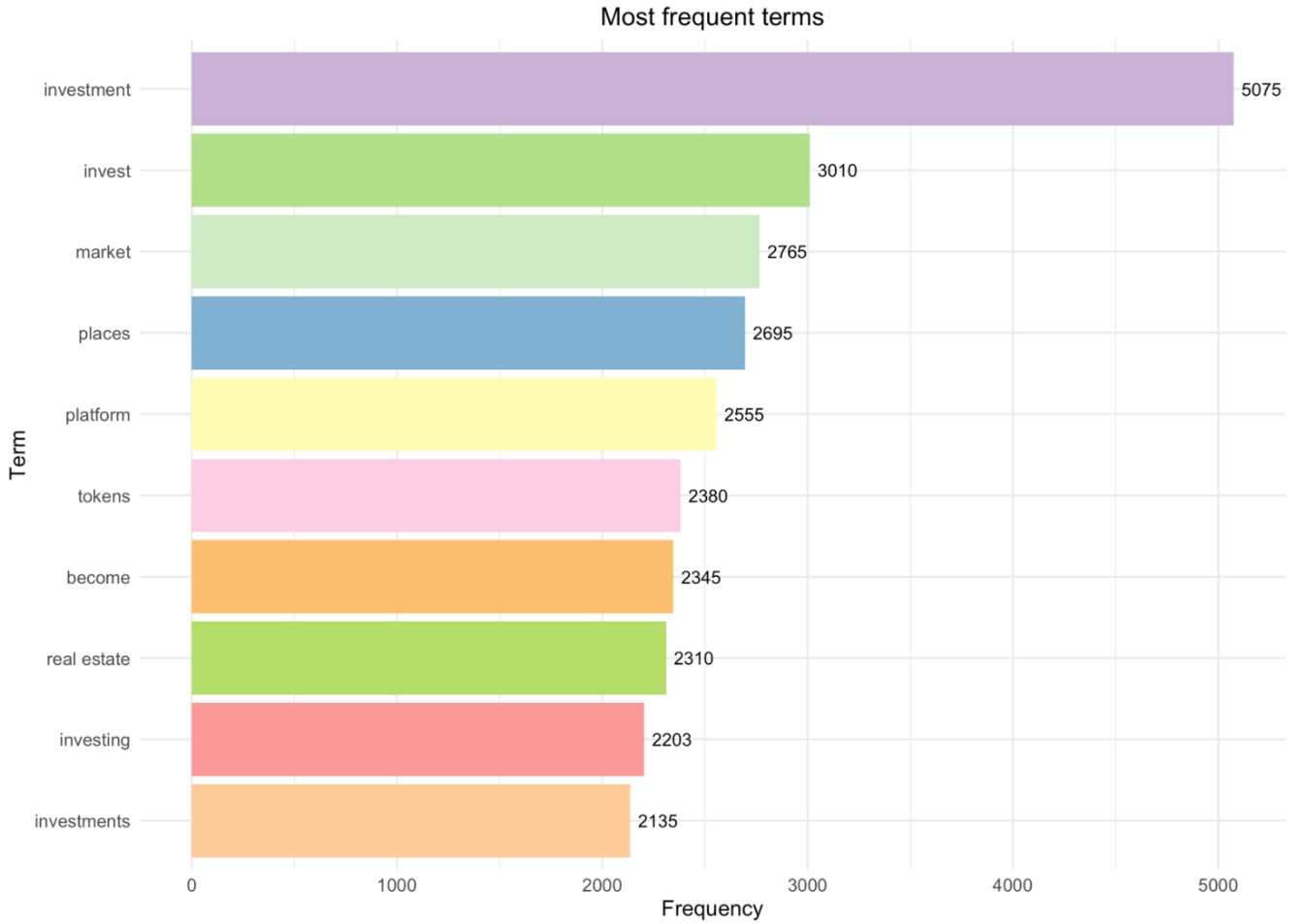

Figure 1 presents a horizontal bar chart of the most frequent terms appearing in the analyzed corpus related to housing tokenization in Chile. The term "investment" dominates the discourse with a count of 5,075 occurrences, followed by "invest" (3,010) and "market" (2,765), underscoring a strong thematic emphasis on financial returns and market participation. Other frequently occurring terms include “places” (2,695), “platform” (2,555), and “tokens” (2,380), which point to the technological and spatial framing of investment narratives. Notably, “real estate” (2,310) and “investing” (2,203) also rank highly, suggesting a focus on real estate as both a financial asset and a digital opportunity.

Figure 2 displays a word cloud representing the most prominent terms in the online discourse surrounding housing tokenization in Chile. The central dominance of “investment,” “invest,” “market,” and “platform” highlights the narrative’s financial orientation, where tokenization is framed as a mechanism to access and diversify real estate investments. The recurrence of terms such as “real estate,” “tokens,” “profits,” and “returns” suggests an emphasis on wealth generation and asset securitization. Additionally, references to “technology,” “blockchain,” and “fintech” point to the legitimizing role of digital innovation in these discourses. Notably, words like “access,” “opportunities,” and “diversify” reflect a promise of democratization, while the presence of “risk,” “rent,” and “worth” reveals underlying concerns about value and exposure. The word cloud thus illustrates a techno-financial utopia where housing is reimagined as a liquid, data-driven investment vehicle—potentially sidelining its social function.

Figure 2. Word cloud of the most prominent terms in the online discourse surrounding housing tokenization in Chile.

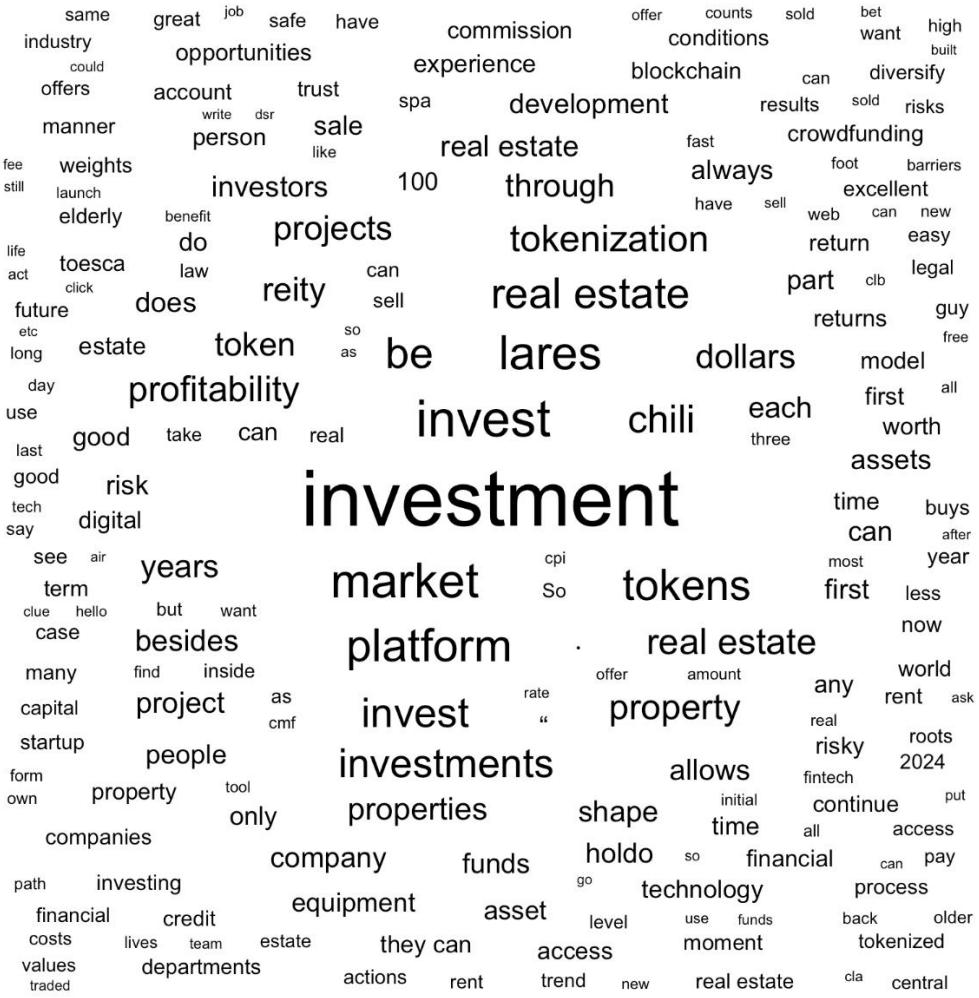

Figure 3 presents the distribution of emotions detected in the corpus related to real estate tokenization in Chile, based on the NRC sentiment lexicon, which categorizes words into eight primary emotions: trust, sadness, anger, fear, disgust, anticipation, joy, and surprise. These emotions are computed by matching words in the corpus to those associated with each emotion in the lexicon, and aggregating their relative frequencies. The most dominant emotion is trust (0.384), indicating that the discourse heavily relies on a rhetoric of credibility, safety, and reliability—typical of financial promotional language aiming to reassure potential investors. This is consistent with the presence of terms like "platform," "experience," and "return," suggesting a discursive strategy that positions tokenization as a dependable and legitimate innovation. Negative emotions follow, with sadness (0.138), anger (0.111), and fear (0.104), revealing some

undercurrents of concern, dissatisfaction, or skepticism. These may reflect references to market volatility, accessibility challenges, or critique of systemic issues in real estate. Disgust (0.088) could point to discomfort with financial speculation or inequality, while anticipation (0.084) signals the forward-looking, future-oriented framing of blockchain investment narratives. Lower levels of joy (0.051) and surprise (0.040) suggest that the discourse avoids overly enthusiastic or unpredictable tones, aligning instead with a calculated, aspirational tone. This emotional configuration reinforces the idea of a techno-optimistic, investor-friendly narrative with limited attention to emotional or social stakes.

Figure 3. Distribution of emotions detected in the corpus related to real estate tokenization in Chile using NRC sentiment lexicon.

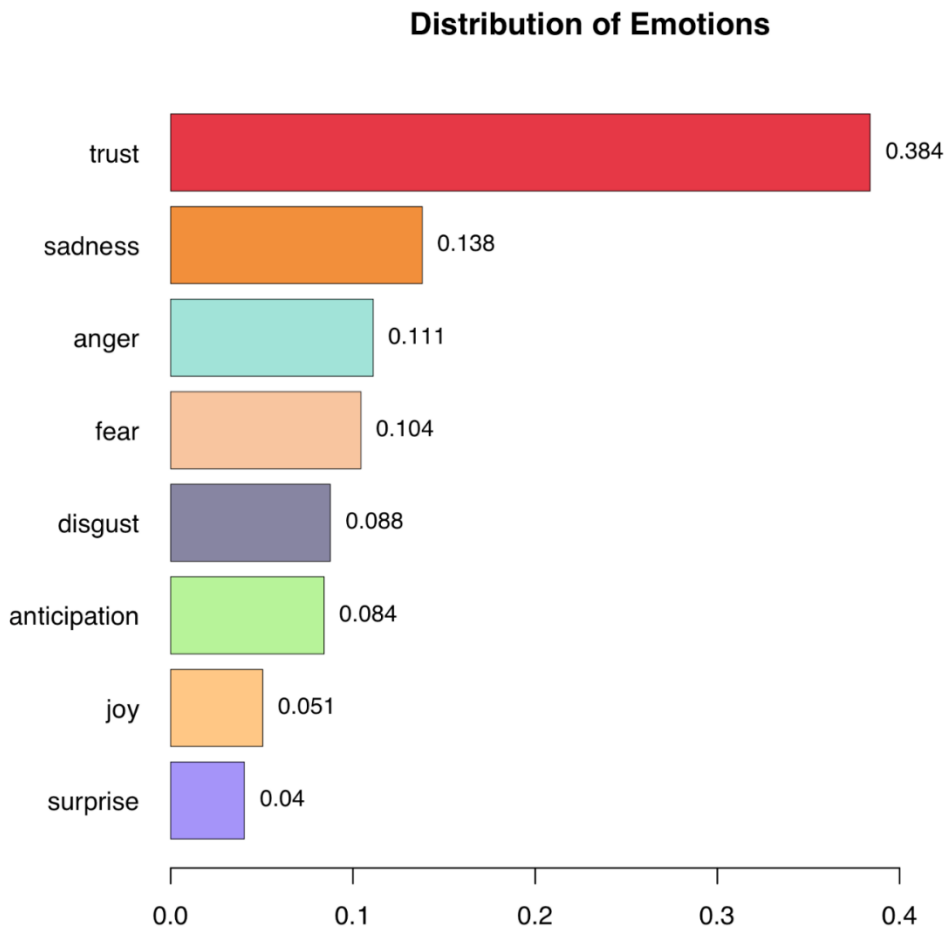

Figure 4. Latent Dirichlet Allocation (LDA) topic modelling analysis.

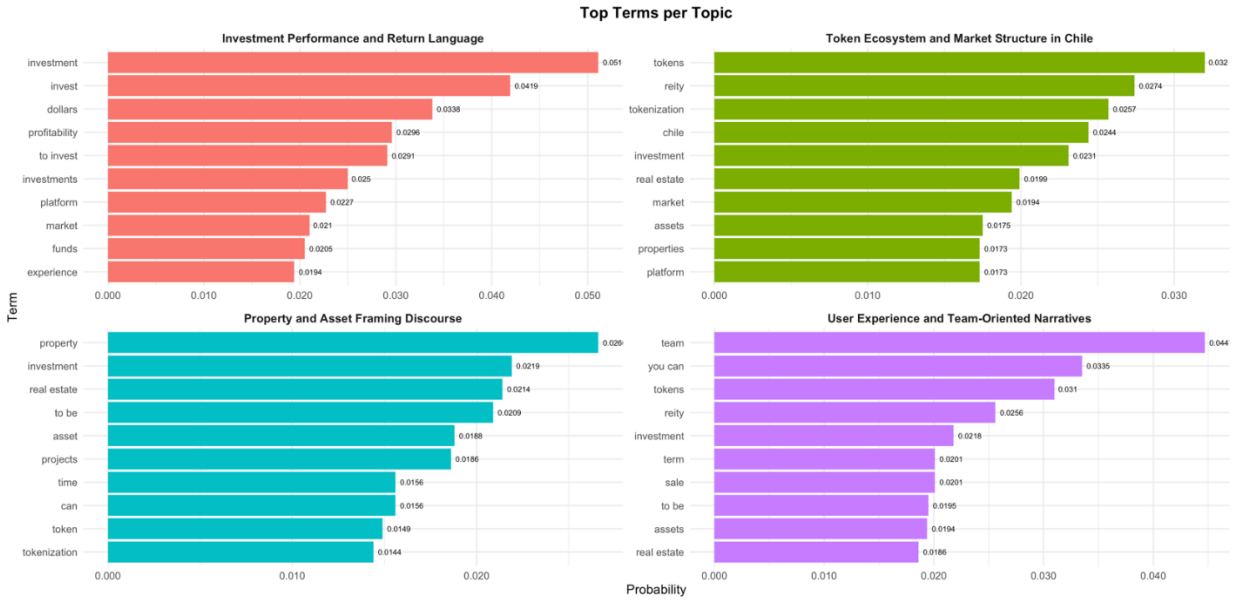

Figure 4 illustrates the results of a Latent Dirichlet Allocation (LDA) topic modelling analysis, which grouped co-occurring terms into four semantically distinct themes based on the probability distribution of terms across the corpus. This unsupervised machine learning technique identifies hidden thematic structures in large text datasets by clustering terms that frequently appear together in similar contexts. The first topic, "Investment Performance and Return Language," is characterized by terms like "investment," "dollars," "profitability," and "funds," suggesting a discourse that emphasizes financial performance, capital gains, and return on investment. This reflects a dominant economic rationale driving the tokenization of housing. The second topic, "Token Ecosystem and Market Structure in Chile," includes terms such as "tokens," "Reity," "tokenization," "Chile," and "platform." This points to an emergent local ecosystem of proptech actors and regulatory frameworks, with a strong emphasis on branding, national context, and technological infrastructure. The third topic, "Property and Asset Framing Discourse," features terms like "property," "real estate," "asset," and "projects," revealing how tokenized housing is rhetorically constructed as a tangible, commodified and securitized asset class, detached from its traditional social and spatial dimensions. The fourth topic, "User Experience and Team-Oriented Narratives," highlights terms like "team," "you can," and "sale," suggesting a focus on user empowerment, platform usability, and a personalized, collaborative investment environment. These clusters expose

a techno-financial discourse that frames tokenization not just as a technical solution, but as a market-oriented reconfiguration of housing investment culture.

Figure 5. Semantic co-occurrence network

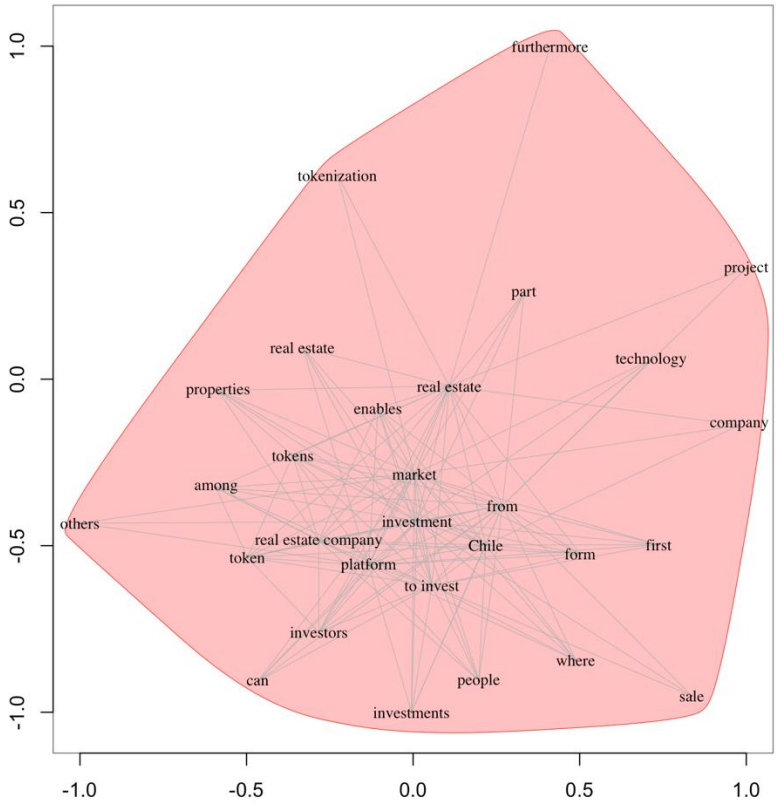

Figure 5 presents a semantic co-occurrence network, a visualisation of the relational proximity between frequently co-occurring terms in the corpus of websites addressing housing tokenization in Chile. The analysis was performed by tokenising the textual data, removing stop words, and calculating pairwise term co-occurrences within documents. Only frequent co-occurrences (above a predefined threshold of 15) were retained to build the graph, which was then rendered using a force-directed layout algorithm to cluster semantically related terms. In this network, each node represents a word, while edges indicate co-occurrence relationships. The proximity and density of connections suggest which terms frequently appear together, indicating thematic coherence. The graph reveals a highly centralised structure around terms like “investment,” “market,” “platform,” “token,” “real estate,” and “Chile”, suggesting these are discursively central elements. The presence of terms like “enables,” “people,” “properties,” “investors,” and “company” reflects a narrative built around accessibility, agency, and the infrastructural apparatus of tokenized investment.

Peripheral terms such as "technology," "project," "form," and "furthermore" suggest supporting discourses related to innovation and justification. This network structure highlights how discourses on tokenization are tightly interwoven with financial, technological, and territorial imaginaries. The results imply a communicative strategy aimed at legitimising tokenized real estate as an accessible and trustworthy investment tool, supported by localised and platform-oriented narratives.

4. Discussion

The empirical analysis performed in this paper contributes to the existing literature on housing tokenisation and blockchain applications, particularly in emerging markets like Chile, by critically unpacking the optimistic narratives surrounding these technologies. The findings from the discourse analysis show that tokenisation is prominently framed as a financial innovation that emphasises investment, profitability, and market-oriented strategies. This aligns with Baum (2021) and Proskurovska (2023), who highlight that blockchain-based tokenisation is frequently promoted as a mechanism for democratising investment and increasing market liquidity. However, the results of the semantic and emotional analyses reveal an overwhelmingly techno-optimistic discourse dominated by terms associated with trust, financial performance, and market accessibility. This mirrors concerns raised by Martino and Ringe (2025) regarding potential risks embedded within tokenisation, such as amplifying speculative behaviours and exacerbating existing socio-spatial inequalities.

The observed prevalence of trust and anticipation in the emotional discourse indicates a strategic attempt by digital platforms to establish legitimacy and reduce perceived investment risks. This emotional framing aligns with the literature on financialisation and tokenisation, suggesting tokenisation serves more as an investment vehicle rather than a tool for genuine housing affordability (Wijburg & Waldron, 2020). Moreover, the relatively lower scores of negative emotions such as sadness and fear indicate an implicit suppression or marginalisation of critical perspectives, reflecting the broader dynamics highlighted by Hidalgo Dattwyler et al. (2022) and Blakeley (2020) on the depoliticisation of housing through market logics.

In exploring the identified thematic clusters, it becomes evident how narratives around "Investment Performance and Return Language" dominate the tokenisation discourse, reinforcing Aalbers' (2017) assertion that financialised housing predominantly serves investment interests rather than social housing needs. Furthermore, the thematic emphasis on "Token Ecosystem and Market Structure in Chile" suggests a robust emerging local infrastructure that integrates national and global financial circuits, raising critical questions about national economic sovereignty and stability, consistent with the concerns noted by Böhmecke-Schwafert (2024).

Importantly, the findings anticipate significant public policy implications. The prevalence of market-oriented discourse and the lack of substantive critique regarding affordability highlight how tokenisation could further entrench housing commodification. This is particularly concerning given the context outlined by Vergara-Perucich (2022), where Chilean housing policies historically have facilitated financialisation processes, prioritising investor returns over social equity. Tokenisation, under such conditions, could exacerbate rather than alleviate affordability pressures by introducing additional layers of financial complexity and speculative risk.

Additionally, the semantic co-occurrence analysis illustrates the interconnectedness of investment-oriented terms like "market," "investment," "tokens," and "real estate," suggesting that tokenisation discourse reinforces existing financialised logics rather than challenging them. This closely aligns with theoretical critiques offered by Fernandez and Aalbers (2020) and Urbina (2024), who caution against further entrenching neoliberal market principles through supposedly inclusive innovations.

The critical examination provided by this study reveals that tokenisation, despite its potential advantages in transparency and accessibility, primarily functions as a mechanism of financial innovation aligned closely with existing market logics and speculative investment behaviours. This situation poses substantial challenges for public policy, as tokenisation might obscure the underlying structural issues within housing markets. Policymakers should thus approach tokenisation with caution, recognising its potential to deepen market volatility and housing inequalities unless accompanied by stringent regulatory frameworks, macroprudential

controls, and redistributive policies explicitly designed to ensure affordability and equity.

Furthermore, the integration of tokenisation into housing markets in Chile must not be considered merely a technical or economic innovation but rather a deeply political-economic issue. As underscored by Dattwyler et al. (2022), effective governance and oversight mechanisms are essential to mitigate the speculative dynamics introduced by these financial technologies. Without robust intervention, tokenisation risks perpetuating cycles of socio-spatial segregation and undermining the social right to housing.

Lastly, these empirical insights critically stress the relationship between innovation and sustainable development. Tokenisation undeniably embodies innovation through its use of blockchain technology, yet its potential contribution to sustainable development remains ambiguous at best, contingent upon rigorous oversight and balanced governance.

5. Conclusions

This article offers an empirically grounded contribution to the literature on financial innovation and housing by examining how the discourse of tokenization is constructed and circulated within the Chilean digital ecosystem. Its findings reveal that the dominant narratives are characterized by techno-optimism, financial accessibility, and investor-centric language. The most frequent terms—such as "investment," "platform," and "market"—suggest a strong emphasis on real estate as a digitized and securitized asset class. Sentiment and emotion analysis confirmed a discursive predominance of “trust” and “anticipation,” underscoring the rhetorical positioning of tokenization as a low-risk and future-oriented innovation. Thematic clustering through topic modeling further identified four key areas: return-oriented discourse, the development of the local token ecosystem, property reframing, and user-focused empowerment narratives. These findings indicate a potential reconfiguration of real estate logics in line with platform capitalism and financialization processes transparently.

The study’s methodology opens new avenues for discursive research on financial innovation, particularly in data-scarce environments typical of emerging markets. Future research could further enhance this methodology

by integrating multilingual sentiment lexicons, applying critical discourse analysis, or triangulating web-based data with interviews, policy texts, and financial indicators. A more longitudinal approach might also trace how tokenization narratives evolve over time in response to regulatory changes or market volatility.

While the empirical scope and computational tools employed offer robustness, this research has limitations. The dataset is composed exclusively of publicly available web content, which inherently reflects promotional agendas, corporate narratives, and optimism bias. Moreover, despite efforts to translate and normalize terms, the lexicons used for sentiment and emotion detection are developed primarily for English, potentially limiting semantic precision when applied to Spanish-language content.

From a policy standpoint, the findings raise important concerns. The optimistic and deregulatory framing of tokenization risks legitimizing further housing commodification without adequate scrutiny of distributional consequences. In contexts like Chile, where housing affordability is already strained by financialization, the uncritical embrace of tokenization may deepen social inequalities and erode the social function of housing. Policymakers must, therefore, resist the allure of innovation-for-innovation's-sake and ensure that blockchain-based solutions are integrated into coherent urban and housing strategies that uphold equity, transparency, and democratic accountability.

At the intersection of innovation and development, this research underscores a paradox. While tokenization promises to democratize property ownership and broaden access to investment, it simultaneously embeds housing deeper into financial circuits, accelerating its abstraction from lived social needs. In the Global South, where institutional fragility and spatial inequality persist, the adoption of such technologies must be carefully evaluated. This study advocates for a developmental approach to innovation—one that is sensitive to local realities, aligned with public interest, and responsive to the unintended consequences of digital financial transformations.

References

Aalbers, M. B. (2017). The variegated financialization of housing. *International Journal of Urban and Regional Research, 41*(4), 542–554. https://doi.org/10.1111/1468-2427.12522

Ahl, A., Yarime, M., & Tanaka, K. (2022). Sustainability implications of blockchain for governance and policy. *Financial Innovation, 9*(3), 25. https://doi.org/10.3390/fi9030025

Ahluwalia, P., Ma, D., & Zheng, Y. (2020). Blockchain-based equity crowdfunding: A review of research trends, opportunities, and challenges. *Journal of Business Venturing Insights, 13*, e00203. https://doi.org/10.1016/j.jbvi.2020.e00203

Al, A. (2024). Blockchain applications in digital government: From transparency to transformation. *Asia-Pacific Journal of Environmental Law, 27*(1), 44–61. https://doi.org/10.33327/ajee-18-7.3-a000322

Alshahrani, A., Khowaja, S. A., & Alotaibi, R. (2023). A review of blockchain consensus algorithms: Challenges and opportunities. *Renewable and Sustainable Energy Reviews, 165*, 112623. https://doi.org/10.1016/j.rser.2022.112623

Avci, G., & Erzurumlu, Y. O. (2023). Blockchain tokenization of real estate investment: A security token offering procedure and legal design proposal. *Journal of Property Research, 40*(2), 188–207. https://doi.org/10.1080/09599916.2023.2167665

Baptista, J., Stein, M. K., Klein, S., Watson-Manheim, M. B., & Lee, J. (2023). Digital infrastructures for property investment: Blockchain tokenization in real estate. *Sustainability, 15*(16), 12288. https://doi.org/10.3390/su151612288

Baum, A. (2021). Tokenization—The Future of Real Estate Investment? *The Journal of Portfolio Management, 47*(10), 41–61. https://doi.org/10.3905/jpm.2021.1.260

Baum, A. (2021). Tokenization—The future of real estate investment? *The Journal of Portfolio Management, 47*(10), 41–61. https://doi.org/10.3905/JPM.2021.1.260

Bellavitis, C., Fisch, C., & McNaughton, R. B. (2022). Governance in blockchain-based organizations: A systematic review and research agenda. *Journal of Business Research, 143*, 263–277. https://doi.org/10.1016/j.jbusres.2022.01.036

Berenjestanaki, K. S., Nourani, M., & Mohammadzadeh, M. (2023). Blockchain in e-voting systems: A systematic literature review. *Electronics, 13*(1), 17. https://doi.org/10.3390/electronics13010017

Beswick, J., et al. (2019). Speculating on London's Housing Crisis. *City, 23*(1), 1–17. https://doi.org/10.1080/13604813.2017.1374783

Blakeley, G. (2020). Financialization, real estate and COVID-19. *Community Development Journal, 55*(4), 517–532. https://doi.org/10.1093/cdj/bsaa056

Böhmecke-Schwafert, M. (2024). Blockchain and real estate tokenization: Opportunities and challenges in integrating global markets. *Telecommunications Policy, 48*(3), 102835. https://doi.org/10.1016/j.telpol.2024.102835

Cagigas, F. C., Carrasco, F., & Cruz-Rodriguez, A. (2021). Blockchain and smart cities: The role of distributed technology in urban transformation. *IEEE Access, 9*, 3050–3070. https://doi.org/10.1109/ACCESS.2021.3052019

Carrasco-Gallego, J. A. (2020). Macroprudential policy and housing market stability: Lessons for Spain. *European Journal of Law and Economics, 49*(1), 157–177. https://doi.org/10.1007/s40804-019-00138-y

Chawla, V. (2020). Algorithmic trust and the paradox of blockchain governance. *New Media & Society, 22*(10), 1832–1850. https://doi.org/10.1177/1461444819886213

Chen, L., Xu, L. D., & Zhou, L. (2022). Blockchain technology in supply chain management: Applications and challenges. *Journal of Cleaner Production, 351*, 131437. https://doi.org/10.1016/j.jclepro.2022.131437

Chiu, I. H.-Y., & Greene, E. F. (2019). The marriage of technology, markets and sustainable (and social) finance: Insights from ICO markets for a new regulatory framework. *European Business Organization Law Review, 20*(1), 139–169. https://doi.org/10.1007/s40804-019-00138-y

Chow, P. S., & Tan, Y. H. (2021). Real estate tokenization in Asia-Pacific. *Journal of Property Investment & Finance*. Advance online publication. https://doi.org/10.1108/jpif-07-2024-0087

Cocco, L., Marchesi, M., & Tonelli, R. (2017). Proof-of-work algorithms for energy-aware blockchains. *Journal of Industrial Information Integration, 7*, 16–23. https://doi.org/10.1016/j.jii.2017.02.003

Cortés-Urra, N., et al. (2023). Desplazamientos forzados y resistencias territoriales. *City, 27*(2), 233–250. https://doi.org/10.1080/19491247.2022.2159123

Dattwyler, R. H., et al. (2016). El neoliberalismo subsidiario. *Andamios, 13*(32), 101–132. https://doi.org/10.29092/uacm.v13i32.525

Dattwyler, R. H., et al. (2022). Your House, Your Debt. *Revista INVI, 37*(105), 1–44. https://doi.org/10.5354/0718-8358.2022.63809

Dong, X., Huang, D., & Xu, J. (2023). Trustless finance? Blockchain and the reconfiguration of economic agency. *Digital Applications in Archaeology and Cultural Heritage, 100344*. https://doi.org/10.1016/j.dajour.2023.100344

Fainstein, S. S. (2016). The Just City. *International Journal of Urban Sciences, 20*(1), 1–14. https://doi.org/10.1080/12265934.2016.1145830

Fernandez, R., & Aalbers, M. B. (2017). Housing and capital in the 21st century: Realigning housing studies and political economy. *Housing, Theory and Society, 34*(2), 151–158. https://doi.org/10.1080/14036096.2017.1293379

Fernandez, R., & Aalbers, M. B. (2020). Housing financialization in the Global South. *Housing Policy Debate, 30*(4), 680–701. https://doi.org/10.1080/10511482.2019.1681491

Frolov, A. (2020). Transaction costs, trust, and blockchain. *Journal of Institutional Economics, 16*(6), 865–879. https://doi.org/10.1017/S1744137420000272

Grubbauer, M. (2019). Housing microfinance and the financialisation of housing in Latin America and beyond. *International Journal of Housing Policy, 19*(3), 400–422. https://doi.org/10.1080/19491247.2018.1448155

Hidalgo Dattwyler, R., et al. (2019). Subsidio habitacional y segregación urbana. *Housing Studies, 34*(4), 621–640. https://doi.org/10.1080/02673037.2018.1458287

Hidalgo Dattwyler, R., et al. (2022). Your House, Your Debt. *Revista INVI, 37*(105), 1–44. https://doi.org/10.5354/0718-8358.2022.63809

Jaoude, J. A., & Saadé, R. G. (2019). Blockchain applications–usage in different domains. *IEEE Access, 7*, 45360–45381. https://doi.org/10.1109/ACCESS.2019.2902501

Khan, A. H., Nur, S., & Aslam, R. (2021). Blockchain's role in ensuring energy sustainability. *Renewable and Sustainable Energy Reviews, 138*, 110535. https://doi.org/10.1016/j.rser.2020.110535

Kummer, T. F., Schulte-Althoff, M., & Rotzoll, M. (2020). Blockchain for logistics and supply chain management: Organizational theories in practice. *Journal of Business Research, 123*, 373–384. https://doi.org/10.1016/j.jbusres.2020.09.059

Lacity, M. (2022). *Blockchain Fundamentals for Executives*. Springer. https://doi.org/10.1007/978-3-030-95717-6

Martino, M., & Ringe, W. G. (2025). Tokenization and financial externalities. *European Review of Regulatory Reform*. Advance online publication. https://doi.org/10.1017/err.2024.87

Nasarre-Aznar, S. (2018). Collaborative housing and blockchain. *Administration, 66*(2), 59–82. https://doi.org/10.2478/admin-2018-0018

Nowiński, W., & Kozma, M. (2017). How can blockchain technology disrupt the existing business models? *Entrepreneurial Business and Economics Review, 5*(3), 85–98. https://doi.org/10.15678/EBER.2017.050309

Paulavičius, R., Šaltenis, Š., & Garsva, G. (2019). Blockchain technology: Applications, challenges and future trends. *Informatica, 30*(1), 183–192. https://doi.org/10.15388/informatica.2019.227

Pérez, F. (2017). El derecho a quedarse. *Housing Studies, 32*(5), 583–605. https://doi.org/10.1080/02673037.2016.1210097

Popov, E., Veretennikova, A., & Fedoreev, S. (2022). Model of OTC securities market transformation in the context of asset tokenization. *Mathematics, 10*(19), 3441. https://doi.org/10.3390/math10193441

Porras-Gonzalez, A., Rosales, R., & Sanchez, M. (2019). Blockchain for sustainable business: From efficiency to innovation. *International Journal of Innovation and Sustainable Development, 13*(1), 32–50. https://doi.org/10.1504/IJISD.2019.096579

Proskurovska, A. (2023). Re-inventing housing finance with blockchain: The case of Sweden. *Geoforum, 147*, 103884. https://doi.org/10.1016/j.geoforum.2023.103884

Ramadoss, B. (2022). Blockchain evolution: A three-stage model. *IEEE Potentials, 41*(3), 28–32. https://doi.org/10.1109/MPOT.2022.3208395

Reyes, D. (2020). Urban land and housing in Latin America. *Urban Geography, 41*(8), 1116–1136. https://doi.org/10.1080/02723638.2020.1745760

Saari, A., Raappana, H., & Muttilainen, J. (2022). Blockchain in the real estate industry: Conceptual foundations and empirical prospects. *Land Use Policy, 112*, 106334. https://doi.org/10.1016/j.landusepol.2022.106334

Swinkels, L. (2023). Empirical evidence on the ownership and liquidity of real estate tokens. *Financial Innovation, 9*(1), 45. https://doi.org/10.1186/s40854-022-00427-5

Swinkels, L. (2023). Empirical evidence on the ownership and liquidity of real estate tokens. *Financial Innovation, 9*(1), 45. https://doi.org/10.1186/s40854-022-00427-5

Tripathi, A., Gupta, S., & Kumar, R. (2023). Blockchain applications and challenges: An updated review. *PeerJ Computer Science, 9*, e1705. https://doi.org/10.7717/peerj-cs.1705

Urbina Julio, J. (2024). Financiarización y arriendo en Chile. *Urban Studies, 61*(1), 34–52. https://doi.org/10.1080/0042098016630488

Vergara-Perucich, F. (2022). Financial flows and housing markets in Chile. *Economies, 10*(6), 125. https://doi.org/10.3390/economies10060125

Vergara-Perucich, F., & Aguirre-Nuñez, C. (2019). Inversionistificación en América Latina. *Hábitat y Sociedad, 12*, Article 12. https://doi.org/10.12795/habitatysociedad.2019.i12.02

Wainwright, T., & Manville, G. (2017). Financialization and the third sector. *Environment and Planning A, 49*(4), 819–838. https://doi.org/10.1177/0308518X16684140

Wainwright, T., & Manville, G. (2017). Financialization and the third sector: Innovation and impact in social housing bond markets. *Environment and Planning A, 49*(4), 819–838. https://doi.org/10.1177/0308518X16684140

Wijburg, G., & Waldron, R. (2020). Financialization and affordable housing. *Critical Housing Analysis, 7*(1), 12–22. https://doi.org/10.13060/23362839.2020.7.1.508

Xu, X., Weber, I., & Staples, M. (2022). *Architecture for Blockchain Applications*. Springer. https://doi.org/10.1007/978-3-319-69659-1

Yeoh, P. (2017). Regulatory issues in blockchain technology. *Journal of Financial Regulation and Compliance, 25*(2), 196–208. https://doi.org/10.1108/JFRC-08-2016-0068