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Security Token Offerings as a Complementary Financing Instrument for Early-Stage Startups: Evidence from Germany

Alexander Zureck
FOM Fachhochschule für Wirtschaft und Management
Jan Asbach
FOM Fachhochschule für Wirtschaft und Management
Katerina Maria Schmitz-Jakovou
katerina.mariaschmitzjakovou@usp.ceu.es

CEU San Pablo Universität

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Abstract

This study examines how Security Token Offerings (STOs) are adopted to address specific financing challenges in the German entrepreneurial ecosystem. Findings indicate that STOs are not a direct replacement for traditional Venture Capital (VC) funding, but act as a complementary instrument. Their main value lies in enhancing efficiency by reducing bureaucratic costs, facilitating flexible hybrid financing models, and strengthening community and employee engagement. Specialized STO-platforms emerge as crucial intermediaries, providing necessary legal frameworks and infrastructure. Despite these benefits, widespread adoption is hindered by usability issues and insufficient abstraction of the technology as well as low investor acceptance, stemming from the speculative reputation of earlier ICOs. STO-platforms are primarily responsible for improving the investor user experience. While experts have a positive outlook on adoption and see the practical impact of STOs already today, mass adoption is not expected over the next few years. This study contributes to the literature by highlighting the phenomenon of regulated re-intermediation and providing nuanced insights into the practical application of tokenization for non-blockchain-native firms in a mature, regulated economy.

1. Introduction

Tokenization is increasingly discussed as a transformative mechanism for entrepreneurial finance, yet empirical evidence on its relevance for early-stage ventures remains scarce. While existing research has mainly examined ICOs as speculative, weakly governed financing instruments (Howell et al., 2020; Momtaz, 2020), security tokens (STOs) represent a fundamentally different class of blockchain-based securities subject to regulatory compliance. Their promise lies in combining the programmability and transferability of tokens with the investor protection and governance structures of traditional securities. Despite this conceptual potential, little is known about how STOs function in the highly idiosyncratic context of early-stage startup financing—an arena characterized by severe information asymmetries, high uncertainty, and strong reliance on relational capital (Mason & Stark, 2004; Kerr et al., 2014).

Current research in entrepreneurial finance emphasizes the growing heterogeneity of funding instruments available to startups, from VC and angel finance to crowdfunding, token-based models, and hybrid mechanisms (Ahlers et al., 2015; Block et al., 2018). Yet STOs remain an under-theorized category. They are often implicitly treated as an extension of equity crowdfunding or as a technological variant of venture capital, despite their distinct governance logic, regulatory framework, and technological affordances. This creates a dual blind spot: (1) STOs are largely absent from theory building on early-stage financing dynamics, and (2) empirical insights into founders' and investors' perceptions, experiences, and adoption barriers are missing. As a result, academic discourse currently lacks conceptual clarity on how and under what conditions STOs may contribute to solving persistent problems in early-stage financing - such as round failures, inefficiencies in capital access, limited investor pools, and structural barriers within strongly regulated environments.

Germany represents a theoretically and empirically relevant case. Its strict regulatory environment, highly formalized investment processes, and reliance on notarial structures amplify coordination costs that startups face in their early years. At the same time, Germany has begun implementing comprehensive regulatory frameworks for digital securities and tokenization (eWpG, MiCAR), creating a unique setting in which STOs can legally and operationally be deployed. This institutional configuration provides an ideal context to study whether STOs can mitigate typical financing frictions in bureaucratic environments and whether they offer comparative advantages over traditional instruments.

Against this backdrop, this study investigates how STOs can support early-stage startup financing in Germany by examining founders' and experts' assessments of efficiency, investor access, governance implications, community effects, and perceptions of risk. The analysis responds to calls for more qualitative, context-rich research on novel financing mechanisms (Cumming & Vismara, 2017; Block et al., 2022) and contributes to bridging the theoretical gap between digital securities and entrepreneurial finance.

The findings highlight that STOs are perceived as particularly valuable for enhancing efficiency in early-stage financing processes, especially in contexts dominated by bureaucratic frictions and small to medium-sized investments. Experts emphasize advantages in continuous and flexible capital raising, reduction of dependency on full funding rounds, and lower transaction costs due to reduced reliance on notarial processes. These insights expand existing theorizing on financial efficiency in constrained institutional environments by illustrating how digital securities can mitigate structural rigidities in early-stage capital acquisition.

Second, STOs are perceived as enabling broader investor access while allowing startups to mobilize existing communities - customers, employees, and partners - as financial stakeholders. This extends crowdfunding theory by showing how STOs can combine community engagement with regulated, transferable securities, offering a hybrid form of participation that is more flexible than traditional equity and more credible than unregulated token sales.

Third, the study identifies tensions around governance, signaling, and investor quality. While STOs democratize access and enable wide participation, they are less attractive to VCs seeking control and voting rights. This clarifies the complementary rather than substitutive role of STOs relative to venture capital and nuances existing assumptions about token-based financing crowding out professional investors (Momtaz, 2024). The findings also show how STOs function as an innovation signal, both technologically and strategically, particularly for startups operating in digitally affine markets.

Fourth, the results shed light on persistent adoption obstacles. Investor acceptance remains low due to negative spillover effects from the ICO era, limited technological abstraction, and lacking liquidity in secondary markets. These insights contribute to literature on technological diffusion and legitimacy (Suchman, 1995; Navis & Glynn, 2010) by demonstrating that STO adoption is shaped not only by regulatory clarity but also by symbolic associations and investor heuristics formed in previous blockchain cycles.

Finally, the study advances theory on digital asset markets by unpacking the paradox of secondary-market liquidity: while token transferability theoretically enables earlier liquidity and new DeFi-based financial functions, low trading volume and difficult price discovery for early-stage ventures constrain practical implementation. This finding refines assumptions in tokenization research suggesting automatic liquidity benefits and highlights the structural chicken-and-egg dynamics that hinder secondary-market development.

Overall, this integrated introduction positions STOs as a distinct, hybrid financing instrument whose value emerges at the intersection of Efficiency, Capital Access, Community Engagement, Governance, and Legitimacy—the core categories identified in Table 1. By synthesizing expert perspectives in a strongly regulated national context, the study contributes to a more nuanced theoretical understanding of when and how STOs can support early-stage startups and clarifies the boundaries of their applicability relative to existing financing mechanisms.

2. Methodology

The following is a high-level description of the Method used to gain the results of this study. To provide transparency about how the results of this study were achieved.

As there is not enough recent data for quantitative methods, expert interviews and a qualitative method is ideal to answer the research question (Van Burg et al., 2022). Nine Interviews should be conducted to generate new insights which should be then analyzed by the qualitative content analysis by Mayring & Fenzl (2019).

For this paper, experts should generally have knowledge and experience of both STOs and startup financing. Specifically, they should either have extraordinary knowledge about the opportunities of tokenization and experience with smart contracts and STOs or have own experience with financing startups with STOs from a founder's perspective or as Investor regarding on-chain assets. To extract the essential content from the interview transcripts, summary content analysis with inductive category development was chosen. The analysis proceeds from top to bottom.

To ensure an appropriate level of abstraction, all interview statements that directly or indirectly relate to STOs in the context of start-up financing were systematically categorized. In order to increase the precision and consistency of the content analysis, clearly defined units of analysis were established. First, the coding unit refers to the smallest meaningful text segment that addresses a specific aspect of the research question. Second, the context unit encompasses the entire interview, which can be consulted to improve the interpretation of individual statements. Third, the evaluation unit corresponds to each fully transcribed interview, forming the basis for systematic comparison across cases.

Building on these definitions, a set of coding rules was introduced to ensure analytical rigor. A code may be applied to multiple coding units as long as they do not occur consecutively; in such cases, consecutive segments with the same meaning are consolidated into a single coding unit. Furthermore,

each code can be assigned to only one subcategory. If identical codes appear in different subcategories, this indicates a conceptual inconsistency that requires either a revision of the coding itself or an adjustment of the subcategory structure. Finally, each subcategory is uniquely linked to one overarching main category, ensuring a coherent and non-overlapping system of classification.

Following the principle of reduction and simplification, the main categories and subcategories were summarized in a final step into the final 4 main categories and 12 subcategories of the final codebook which got applied to all codes.

An intercoder check was conducted as a reliability check. 28 of the 30 randomly selected codes were identically assigned without any further assistance. This corresponds to Cohen's kappa of 0.927 (rounded).

The two differently assigned codes allowed the following conclusion:

Distribution and acceptance are close to each other, as they are somewhat interdependent, but still important to differentiate in order to understand what solutions to adoption problems could be.

Risk management and capital raising: The question of whether risk management is inherent in capital raising is somewhat unclear. However, it remains so, as important differences arise from the founder's perspective for the evaluation, which the layperson might not immediately recognize when coding.

3. Results

The following overview shows a version of the quantitative results.

Table 1
Quantitative Results of qualitative content analysis

Main Category	Subcategory	Rating			Count
		positive	neutral	negative	
Financing	Capital Raising	69.23%	26.92%	3.85%	26
	Efficiency	84.62%	15.38%	0.00%	13
	Risk Management	85.71%	0.00%	14.29%	7
Financing total		**76.09%**	**19.57%**	**4.35%**	**46**
Market Adoption	Usability	33.33%	33.33%	33.33%	18
	Target groups	26.67%	46.67%	26.67%	15
	Acceptance	0.00%	41.67%	58.33%	12
	Spread	36.36%	45.45%	18.18%	11
Market Adoption total		**25.00%**	**41.07%**	**33.93%**	**56**
Regulation & Compliance	Legal framework	40.00%	20.00%	40.00%	10
	Shareholder compliance	85.71%	14.29%	0.00%	7
Regulation & Compliance total		**58.82%**	**17.65%**	**23.53%**	**17**
Additional Benefits	Token features	90.00%	10.00%	0.00%	10
	Secondary markets	30.00%	40.00%	30.00%	10
	Community effects	100.00%	0.00%	0.00%	9
Additional Benefits total		**72.41%**	**17.24%**	**10.34%**	**29**
Total Sum		**54.05%**	**27.03%**	**18.92%**	**148**

The results are presented and interpreted starting with a broad overview before moving to a detailed analysis. Where helpful, the quantitative perspective serves to support the qualitative evaluation.

Experts had a very positive perspective on STOs in general. 54.05% of the statements were positive while only 18.92% were negative. The rest remained neutral. Looking at the distribution of the statements from above, it is noticeable that the topic of "Market Adoption" was particularly important for the experts with 56/148 mentions followed by "Financing" with 46/148 mentions. The main categories "Financing" (76.09% positive statements) and "Additional Benefits" (72.41% positive statements) received the most positive statements. This suggests that STOs can play an interesting role in the financing process for startups. However, the somewhat more mixed picture in the main category "Regulation & Compliance" as well as the rather critical picture in the main category "Market Adoption" gives the impression that there are still some hurdles for STOs for startups in Germany. When experts repeatedly mention regulatory

aspects with varying degrees of assessability, this signals that the legal framework is perceived as either obstructive, unclear or rapidly changing, which has a direct impact on the planning and implementation of STOs for startups.

3. 1 The Core Value Proposition (Efficiency, Flexibility, Community)

STOs are perceived as an effective instrument for capital procurement because they enable continuous fundraising that can be more closely aligned with the actual liquidity needs of early-stage ventures (Table 1). Unlike traditional, round-based financing models, this mechanism supports a flexible hybrid structure that allows start-ups to mobilize capital incrementally as required. The capacity to access funds immediately, without waiting for a financing round to reach a predefined threshold, reduces exposure to the failure of entire rounds—a scenario experts regard as particularly critical when lead investors withdraw. In line with this, more than 88% of the codings in the category Risk Management reflect a positive assessment of STOs' ability to mitigate financing-process uncertainty.

Efficiency gains constitute another central finding. In highly regulated environments such as Germany, STOs significantly lower administrative burdens by reducing the reliance on notaries and commercial registry processes for small and medium-sized investments. The digital execution of investment procedures shortens transaction times and decreases costs, generating measurable improvements in operational efficiency. At the same time, STOs broaden investor access by enabling participation from business angels and small investors without creating complexity in shareholder structures, thereby strengthening inclusivity within the investor base.

A limitation arises from the volume potential of STO-based investments. Because STOs often target communities, retail investors, and business angels, they tend to be less suited for very large tickets. The codings in the categories Investor Type and Volume Constraints show that high-value investors are typically integrated through conventional mechanisms, while STOs serve as a complementary channel. Venture capitalists maintain a preference for equity instruments that guarantee co-determination rights, reinforcing the finding that STOs cannot substitute established financing routes for substantial growth capital but instead augment them through flexibility and community engagement.

Community effects are consistently assessed as highly positive. STOs strengthen relational ties with customers, partners, and employees by aligning financial participation with company identification—an effect similar to what the literature describes for reward-based or equity crowdfunding. The ability to deepen engagement is complemented by structural advantages in employee participation models: token-based profit participation rights can reduce the tax burden compared to traditional ESOP structures, thereby increasing their attractiveness for start-ups seeking to retain talent.

3.2 The Crucial Role of STO-platforms

The findings show that STO platforms occupy a central position in the emerging market for tokenized securities. Their role is evaluated highly positively across the key categories of Efficiency, Shareholder Compliance, Risk Management, and Legal Framework, which together form the core dimensions through which experts assess their relevance. By reducing transaction costs, enabling standardization, and decreasing regulatory uncertainty, STO platforms address several of the most critical barriers faced by resource-constrained start-ups. They provide the technical and legal infrastructure required for the efficient and legally compliant issuance of digital securities. Without this infrastructure, individual tokenization projects would only become economically viable at substantially higher issuance volumes, typically exceeding five million euros. Through standardized contracts and clearly defined regulatory guidelines, platforms ensure immediate access to legally secure processes.

A central aspect of platform functionality is the automation of compliance procedures - an area consistently rated as one of the most positively perceived subcategories. The programmability of blockchain technology enables the seamless integration of KYC and AML processes into the token issuance workflow. More than 85% of experts in the study assess this programmable compliance as a major advantage, highlighting its capacity to reduce administrative burdens, ensure accuracy, and facilitate cross-border investor participation. The technical architecture allows for selective admission of investors and the exclusion of specific jurisdictions, thereby strengthening both compliance and operational control.

STO platforms also make a significant contribution to Risk Management, another highly rated category in the expert assessment. By linking tokens to verifiable ownership records, they enable the precise identification of legitimate owners in cases of technical failures or security breaches. This linkage allows compromised tokens to be invalidated and reissued in a controlled manner. Furthermore, the technological independence of tokens from the issuing platform - meaning that tokens continue to exist even if the platform ceases operations - enhances systemic robustness and reduces long-term operational risk for start-ups.

In addition, STO platforms play a crucial role in the professionalization and legitimization of the market. Their activities strengthen usability, reduce information frictions, and accelerate the diffusion of digital financial innovations. These developments directly support the category of *Efficiency*, as platform-driven standardization reduces coordination costs and simplifies the issuance process. At the same time, regulatory requirements - such as mandatory identification procedures for small-scale investors - create operational frictions that highlight the need for future regulatory adjustments within the broader Legal Framework dimension.

Finally, the widespread adoption of STOs depends heavily on the availability of professional distribution capabilities, which many start-ups lack due to limited experience with regulated financial products. Consequently, STO platforms are essential for providing structured distribution, legal support, and access to investor networks. This function is closely linked to the category of Shareholder Compliance, as platforms ensure that investor relations and required disclosures are handled in a compliant and

standardized manner. Overall, STO platforms serve both as technological infrastructure and as market-oriented intermediaries, forming a foundational element for the growth, accessibility, and credibility of the STO market.

3.3 The Adoption Problem

Despite their benefits, STOs face substantial adoption barriers, as reflected in Table 1, particularly in the categories Usability and Acceptance. Usability challenges constitute one of the most significant obstacles to widespread diffusion. The current system is still perceived as highly technical, often described as a technology designed “by techies for techies.” This high level of technological visibility stands in contrast to the expectations of most investors. There is a clear need for stronger abstraction of the underlying infrastructure so that tokenization recedes entirely into the background and the blockchain layer becomes functionally invisible to end users. The continued foregrounding of technical processes generates uncertainty among both small retail investors and experienced traditional investors.

Crypto custodians are viewed as a central mechanism for mitigating these frictions. By enabling investors to participate without the need for self-managed wallets, custodians can significantly streamline the user experience and remove one of the most prominent usability barriers. A user interface that integrates custodial services can eliminate wallet-related complexities and thereby enhance overall accessibility.

Investor acceptance remains limited, with all assessments ranging from neutral to negative, as indicated in Table 1. Uncertainty and a general lack of understanding - particularly among older or less technologically familiar investor groups - continue to constrain broader engagement. The lingering reputational effects of the speculative ICO period further exacerbate these challenges, as blockchain-based financial instruments continue to evoke skepticism and defensive reactions among potential investors. In addition, the absence of strong signaling from established, high-profile start-ups reduces the perceived legitimacy of STOs and slows their diffusion. Greater participation from leading companies is considered essential to fostering trust and demonstrating the viability of STOs at scale.

Although current prevalence remains low, STOs are nonetheless expected to develop into a standard financing instrument in the medium term. The near-term outlook is characterized by gradual progress, but broader adoption is anticipated as stakeholders gain a clearer understanding of the value and benefits associated with tokenization. International comparisons reinforce this expectation. Jurisdictions with more advanced regulatory environments - such as the United Arab Emirates, which are constructing integrated digital infrastructures including their own stablecoins - already exhibit higher levels of tokenization maturity. These developments illustrate how conducive legal frameworks can accelerate market penetration.

Overall, STOs are expected to become increasingly accessible due to standardized processes and platform support. Their scalability and simplicity position them as a potential catalyst for entrepreneurial

activity, particularly in ecosystems such as Germany where financing alternatives for early-stage ventures remain limited. STOs are thus viewed as an opportunity to lower entry barriers, stimulate new business formation, and expand participation in entrepreneurial ecosystems.

3.4 Stakeholder & Markets (Investors, Startups, Secondary Market, DeFi)

STOs provide efficiency gains for a wide range of start-ups, yet they offer particular advantages for ventures with large communities or strong B2C brands capable of mobilizing their customer base as potential investors. Start-ups with an established and engaged community benefit from lower acquisition costs and higher conversion rates in retail fundraising. Innovative technology-oriented ventures also tend to experience fewer adoption barriers than locally focused initiatives, as they attract investor groups that are generally more open to digital innovation. In this context, STOs can function not only as a financing instrument but also as a signaling mechanism that communicates technological leadership and market orientation. Token-based structures further enable start-ups to leverage marketing effects by offering token holders exclusive advantages such as early access, privileged information, or preferential pricing at events.

The target group for STO investors is broad and spans friends and family, retail investors who contribute only a few hundred or a few thousand euros, and business angels providing investments at higher ticket sizes. Within this spectrum, the tokenization of profit participation rights has emerged as a widely adopted workaround to circumvent the limitations of existing corporate law. However, such instruments are less attractive for venture capital investors, as they do not offer voting rights or meaningful influence. Larger VC funds typically prefer equity instruments that grant governance rights and strategic involvement. The absence of a regulatory pathway for tokenized equity under the current GmbH framework is viewed as a structural hurdle. A legal reform is regarded as desirable, but significant institutional resistance - especially within the notarial system - limits expectations for near-term change.

A notable discrepancy persists between crypto-affine investor groups and more traditional investors. For the former, token-based investment structures align with established norms, while for the latter, technological abstraction remains essential due to limited familiarity and persistent skepticism. Start-ups with Web3-oriented communities therefore tend to experience stronger alignment and engagement, whereas more traditional ventures often perceive tokenization as an additional communicative and educational burden.

Although STOs can benefit significantly from a strong retail investor base, funding through fans and small investors is not universally regarded as advantageous. The long-term competitiveness of start-ups depends heavily on investor quality, particularly regarding networks, expertise, and strategic resources. These non-financial contributions often exceed the value of capital alone. Consequently, STOs are predominantly viewed as complementary to venture capital rather than a substitute. The flexibility and accessibility of STOs are appreciated, yet they do not fully replace the strategic capabilities associated with traditional VC financing.

There is considerable disagreement regarding the regulatory environment for secondary markets, which is widely regarded as a central constraint on STO liquidity. Some perspectives emphasize that insufficient regulatory clarity and the limited involvement of established exchanges represent the main bottleneck for the industry. Other views highlight the emergence of fully licensed security token exchanges, indicating that functional secondary markets already exist in practice. Regardless of these differences, the inherent transferability of tokens represents a structural advantage over traditional shares, which typically require notarization and more complex transaction procedures. Tokenization thus simplifies peer-to-peer trading and broadens future opportunities for price discovery, trading platforms, and democratized market access.

In principle, secondary market accessibility is considered a key advantage of STOs, as it offers the potential for earlier liquidity for investors. However, the practical liquidity of early-stage tokens remains limited. Trading volumes and market depth are often insufficient to support continuous price formation, leading several experts to question the likelihood of truly liquid markets for early-stage ventures. The ecosystem faces a persistent chicken-and-egg problem: more high-quality tokens require more investors, and more investors require stronger expectations of liquidity. Moreover, many start-ups do not prioritize secondary trading, particularly when their investor base is composed of long-term supporters who are closely aligned with the venture's mission.

Liquidity constraints also limit the realization of more advanced use cases such as the integration of DeFi applications, including token-collateralized lending or non-custodial financial services. While the technological foundations for such models are emerging, their practical viability depends on sufficient market liquidity and stable price signals - conditions that are not yet consistently present in the current STO landscape.

3.5 Biases and Conflicts

The difference in the statements of the startup founders vs. blockchain experts should be emphasized. Although some of the blockchain experts also have startup experience, their statements focus somewhat more on future possibilities of STOs such as integration into DeFi applications to e.g. take out loans on the tokens. Startup founders, even those with blockchain experience, take a much more pragmatic perspective as they try to solve acute problems as efficiently as possible with STOs. While the experts with a blockchain background follow the ethos of e.g. eliminating counterparty risk with reference to the Silicon Valley Bank bankruptcy, among other things, startup founders emphasize efficiency and the independence from the STO-platform through blockchain technology.

4. Discussion

The following discussion of the results of this study differentiates the statements of the literature as well as shedding some light on controversies within the results.

4.1 Legacy ICOs vs. STOs in Germany

Numerous studies around ICOs are focusing on ICOs of web3 native companies. Schückes & Gutmann (2021) describe that in many startups, tokens are a core element interwoven with the business model and project governance from the start. This differs a lot from the reality of a classical web2 startup where an STO is simply a new tool for funding. In a hypothetical scenario of an STO mass adoption, most startups wouldn't be web3 native. While blockchain technology is essential to issue a token for a web2 company, the expectations and characteristics of the web3 community do not necessarily spill over. The image of ICOs and literature is shaped a lot by past ICOs that were public and focused on an on-chain crypto native community. The statement of Belitski & Boreiko (2022) "The volatility of the resulting crypto tokens is attracting short term orientated investors (...). Confident long-term investors are looking more for investments like Bitcoin or Ethereum and are more careful with their investments." shows very well, that often in literature ICOs are perceived as a "web3 company to web3 investors" bubble.

4.2 Disintermediation vs. Regulated Re-intermediation

Using an STO-platform seems to be the most efficient and legally safe way for a startup to conduct an STO. This conflicts with a foundational promise of blockchain technology: Disintermediation, the removal of traditional intermediaries like banks and exchanges, enabling direct peer-to-peer transactions. Early literature on decentralized business models often emphasized this revolutionary aspect. However, the findings of this study compellingly challenge this narrative in the context of a regulated financial market. The German STO ecosystem seems not to be this disintermediated utopia. Instead, it becomes a re-intermediated landscape.

Wang et al. (2022) state that a pre-ICO to institutional investors can help to mitigate the risk of insufficient financing of the public crowd. This study differentiates more and shows that even the opposite is true for web2 startups. Due to the missing voting rights of the token, retails investors and angel investors are way more open to investing in a security token of a startup than bigger institutional investors like VCs. So, the decision to pursue an STO is not merely a technical one but a strategic choice with significant trade-offs involving the type and quality of capital raised. The capital raised via an STO is of a different nature. While it provides funding, it typically does not come with the strategic guidance, industry connections, and governance oversight that a high-quality VC investor provides.

Moxotó et al. (2021) point out that 90% of the funding flows to mostly unregulated ICOs of utility token and only 5% to STOs. In connection, Huang et al. (2020) show unregulated ICOs might be a low barrier for founders as they don't have to spend time studying the regulations. This study underlines another statement from Huang et al. (2020) that unregulated ICOs do not attract high-quality investors and load additional risk of violating local laws on the startup. An STO is the better option.

Lambert et al. (2022) state that a list of excluded jurisdictions might be a positive signal to investors. An STO via an STO-platform goes even further and ensures the compliance of the STO by enforcing KYC and AML checks for investors as well as covering liability risk via a liability umbrella. This is a strong factor of trust for investors and mitigates the risk of self-custody, as investors are identified, and tokens

can be reissued in the event of lost keys. Even if STOs are an efficient instrument to achieve the financing goals, this study highlights the continuous challenge of signaling and marketing for founders to get the right investors that Wang et al. (2022) discussed already. Also, the statement of Belitski & Boreiko (2022) around ICOs stays right for the subgroup of STOs as well that so far there is still no central listing place for tokens to get the investors' attention.

Companies with big communities, direct customer access, or founders with a big network are the best candidates to successfully finance via an STO. They can use STOs as an alternative to classic crowdfunding platforms. With an STO, investors and issuers are less exposed to the strategic dependencies and the platform control over information flow that Bai et al. (2023) describe. However, the core issues of crowdfunding Wessel et al. (2016) are presenting are not solved by it. Asymmetric information (which might be even bigger with STOs that so far have less reporting and transparency duties by the STO-platforms compared to crowdfunding platforms) causes adverse selection of investors and companies. While now there seems to be more innovative companies doing an STO, this intransparency might be causing lower company quality within STOs long term when a broader adoption happens (author’s assumption).

Momtaz (2024) is promoting the role of crypto funds as he points out the massive barriers of complex and individually designed ICOs for an individual investor. The reality for an STO for startups in Germany looks much different. Startups use STOs mainly as a tool for efficiency and to open investment opportunities for their communities and not to focus on crypto funds and public offerings. An STO in Germany conducted via an STO-platform comes with significantly less of those challenges as the STO-platforms take over most of the legal work from the investing individual and often provide a standardized overview of the token characteristics.

4.3 Visionary vs. Practical Perspective

As the ecosystem is very dynamic, and regulation might evolve in Germany over time, tokenization can still be seen as a bridge solution and not the final, definitive solution for financing. Right now, STOs are mainly used very pragmatically to realize flexible and efficient hybrid financing or stakeholder and employee participation.

Visionaries see more opportunities in STOs. The theoretical advantages of easy tradability and secondary market access thus stand in contrast to the practical reality of a lack of liquidity and low trading activity for most STOs of early-stage startups. The same applies to the possibilities of DeFi applications, such as loans on shares. Startups should approach these opportunities with pragmatism. Rather than expecting a revolutionary, liquid market with a flood of investor requests, the focus is increasingly on solving specific problems in the startup investment lifecycle, where traditional share transfers are often cumbersome and expensive. It is yet to be seen if the DeFi opportunities become more relevant with a rising number of investors and STOs, or if startups are not big enough to benefit from those features in general.

4.4 Limitations

There are some limitations to this study. While the questions for the interviews were based on the most recent literature, the results show that the ICOs often described in literature differ a lot from an STO in Germany for startups. Therefore, questions asked could be optimized in a second round of interviews and more experts could be interviewed to make the statistics more sophisticated. Moreover, even if experts from different STO-platforms were interviewed, all interviewed startup founders conducted their STO via one of them as they are the dominant player for young startups. Over time, when more STO-platforms come to play in the German startup market, the experience of Startup founders with STOs could change.

5. Conclusion

This paper contributes to the literature on digital management and entrepreneurial finance by showing how security token offerings can support early-stage startup financing in a regulated digital ecosystem. This enriches the existing research that covers mainly the broader group of ICOs - under which STOs fall - on a global level.

STO-platforms play a crucial role in making the benefits of tokenization accessible to startups in a cost-effective way. Startups and investors benefit from regulation in Germany and legal standards via the STO-platforms. Thanks to the efficiency gains with an STO, startups can also implement new flexible financing models with small investors and easily supplement these with larger investors in the traditional way to create a hybrid model as required. Despite new possibilities, however, an STO is not a panacea for financing needs. The company must continue to be attractive to investors and be marketed by the founder. An STO is particularly attractive if a community already exists. However, it can also be used to support the development of the community or to involve employees and other stakeholders in the success of the company and thus align them. An STO is already very well suited for pragmatic use to simplify processes, simplify transfer and relieve some of the bureaucratic burden in the investment process. Thanks to blockchain technology, there is independence from STO-platforms and possibilities for integrating the token into other blockchain applications. However, advanced features such as liquid secondary markets as within public stock markets or integration into DeFi applications are still a long way off and first require broader adoption in the market.

In the short term, skepticism and ignorance, especially among older generations, will stand in the way of this broader adoption. STO-platforms must continue to improve usability and abstract the technology of the token to such an extent that it is not an inhibition threshold for investors. In addition, there is still potential for improvement in regulation, such as the possibility of tokenizing GmbH shares instead of just profit participation rights or a simplification of the requirements for the legitimization process for investors. In the long term, however, it is likely that STOs will prevail, especially in Germany, due to the reduction of bureaucracy.

Declarations

Author Contribution

J.A. was responsible for the initial conceptual basis of the study and conducted the survey. A.Z. contributed to the review and critical revision of the manuscript. K.S. was responsible for preparing, structuring, and refining the paper for submission.

Acknowledgement

J.A. independently generated the research data and provided the empirical basis for the study.

Data Availability

J.A. independently generated the research data and provided the empirical basis for the study.

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