SMART CONTRACTS AS A POTENTIAL TO ALLEVIATE HOLD-UP, INFORMATION ASYMMETRIES AND WINDOW-DRESSING

Takudzwa Reck – Ondřej Dvouletý

Abstract

This study examines how smart contracts can mitigate inefficiencies in venture capital investments, addressing hold-up problems, information asymmetries, and window-dressing. A conceptual review of smart contracts and venture capital is employed by drawing upon existing theories from economics, finance, and blockchain technology. The study explores how smart contracts can alleviate agency problems and improve contractual enforcement. The observations suggest that smart contracts have the potential to reduce transaction costs, enhance investor confidence, and limit opportunistic behaviour in VC deals. Smart contracts can address traditional inefficiencies that hinder optimal investment performance by automating contractual agreements and ensuring pre-defined conditions are met. The article highlights their potential benefits and limitations in addressing long-standing investment challenges. Specific challenges, such as legal enforceability and technical limitations, remain. Adopting smart contracts in venture capital investments could transform the industry by fostering greater efficiency and reducing risks associated with asymmetric information and strategic misrepresentation. Policymakers and industry stakeholders must address regulatory uncertainties to facilitate broader implementation.

Key words: smart contracts, venture capital, hold-up problem, information asymmetries

JEL Codes: G11, O33, D82

Introduction

Venture capital (VC) provides essential funding for early-stage companies and startups, thus promoting innovation and stimulating economic development. Venture capitalists (VCs) not only provide financial resources but also offer smart money, including strategic direction, network access, and other beneficial resources for their portfolio companies. However, the complex nature of VC investments often gives rise to significant hold-up issues, such as information asymmetries and window-dressing, which could encourage opportunistic

behaviour among entrepreneurs and disrupt the alignment of interests between VCs and entrepreneurs.

In traditional VC agreements, hold-up problems are typically managed through contractual frameworks that assign control rights and incorporate various provisions to safeguard the interests of investors. Despite these precautions, the potential for information distortion and opportunistic conduct sometimes persists. Entrepreneurs, who are motivated and sometimes even reliant on the necessity to secure investment, might resort to window-dressing tactics to boost their companies' short-term performance artificially. Smart contracts exhibit a promising solution to these challenges. Smart contracts are self-executing agreements with terms encoded directly into lines of code, stored on a blockchain, and automatically enforced upon meeting pre-defined conditions. The automation and transparency inherent in smart contracts can potentially alleviate the risks associated with the hold-ups. They offer real-time, precise data and reduce opportunities for manipulation. This technological innovation introduces a unique opportunity to address the issues prevalent in traditional VC agreements (Alharby and Van Moorsel, 2017).

This study explores the extent to which smart contracts can mitigate hold-up problems, such as information asymmetries and window-dressing, in the venture capital space, thereby reducing entrepreneurial opportunism.

This article provides a synthesis of the existing theoretical concepts and frameworks, with the aim of providing a suitable solution to this hold-up problem. It provides insights into how smart contracts can enhance transparency, streamline enforcement, and foster a more balanced and trustworthy relationship between venture capitalists and entrepreneurs. The motivation is to contribute to existing knowledge by providing industry practitioners, entrepreneurs, venture capitalists, and academia with further impulses.

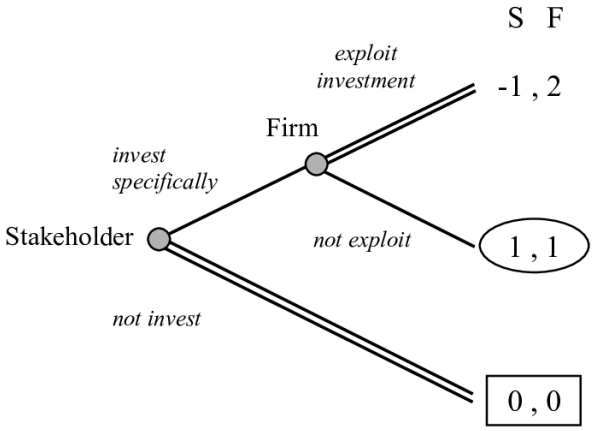
1 Theoretical background

Venture capital is a sub-category of private equity primarily focused on early- and growth-stage funding of new businesses that show solid potential for significant growth and returns. Venture capitalists are involved in different stages of a firm's growth, each with varying financing needs (Gompers, 1995).

1.1 Hold-up and agency problems in venture capital

Hold-up problems, demonstrated in Figure 1, occur when one party to a transaction holds a significant advantage over another party, capturing an unfair advantage over this party through information. This is a problem common to any economic setting, where one party's investment is vulnerable to ex-post expropriation by their partners (Che & Sákovics, 2004).

Fig. 1: Specific Investments and the Resulting Hold-Up Problem as a One-Sided Dilemma



Source: Own elaboration based on the previous research of Hielscher et al. (2014)

A party's stronger position may drive a significant interest in having a specific investment go in their direction (Hielscher et al., 2014). Suppose this phenomenon is transferred to venture investment. In that case, it can be assumed that many startups benefit from being seen in the best light possible to achieve the highest investment possible, giving rise to the potential for information asymmetries (Vazirani et al., 2023). Entrepreneurs may see this as an incentive to engage in "window dressing" by positively biasing the short-term performance of their companies. Entrepreneurs may find themselves driven to act opportunistically when their ventures encounter a significant risk of failure (Jiang et al., 2018).

To mitigate hold-up problems, exit rights, for example, are frequently included in venture capital contracts, especially when the potential for a hold-up problem associated with the venture capitalist's exit decision is anticipated (Bienz & Walz, 2010), which in turn could drive entrepreneurs to rather window-dress their ventures, in a quest not to have to give up the investment. Therefore, venture capital investments often involve complex contractual arrangements to address hold-ups and information asymmetries that may arise between investors and entrepreneurs . Incomplete long-term financial contracts can lead to potentially conflicting objectives. The allocation of control rights plays a crucial role in protecting venture capitalists from hold-ups by entrepreneurs (Kaplan & Strömberg, 2004).

Control rights refer to the ability of a party to impact or intervene in the financial policy or decisions of the other party, after a specific event, such as a covenant violation. These rights may include the ability to force reorganization, divestment, or halt a particular project, but do not necessarily entail the ability to make financing decisions or directly run the firm (Roberts & Sufi, 2009).

1.2 Moral hazard and window-dressing in venture capital

One of the key manifestations of moral hazard in the VC-entrepreneur relationship is the potential for the entrepreneur to take excessive risks with the VC's financial capital. Since the entrepreneur does not bear the full burden of failure, there may be a temptation to pursue overly optimistic strategies that could result in losses for the VC, which in turn leads to suboptimal decision-making and inhibits the company's growth trajectory. Such a moral hazard is commonly referred to as window dressing. This behaviour is often driven by contractual incentives, information asymmetry, and the desire to enhance reputation or attract further investment (Han et al., 2023).

Before deciding on investment or divestment, it may be found that the entrepreneur has motivations to manipulate short-term indicators to decrease the likelihood of the project being liquidated. Focusing on short-term objectives could potentially have a detrimental impact on the long-term success of the project. One effective solution to combat window dressing is the utilization of convertible securities in venture capital contracts. Convertible securities can help align the interests of both. Convertible securities are financial instruments commonly used in venture capital and corporate finance. These securities possess debt and equity characteristics, providing flexibility and benefits to both investors and issuers. Convertible securities can be converted into a predetermined number of common shares of the issuing company at a specified price, offering investors the potential to benefit from the upside of the company's performance while providing downside protection through their debt-like features. They allow venture capital investors to participate in the company's success while providing downside protection through liquidation preferences in case of underperformance (Lauterbach et al., 2007).

The existing literature (Bengtsson, 2011; Alharby and Van Moorsel, 2017) lists further covenants and contractual obligations that may be applied beyond the scope of this paper. For example, Bengtsson (2011) found that covenants are more prevalent with older companies or when fewer venture capitalists invest in a round, since these are harder to enforce when more venture capital firms are involved. This is because early-stage ventures will likely have fewer

assets to ensure a beneficial allocation of rights to these investors making many contractual measures complex and often challenging to enforce.

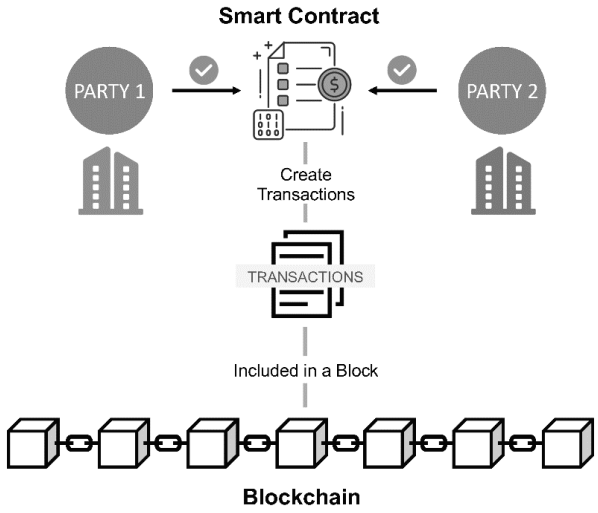
The next subsection discusses the current literature on smart contract theory as a potential remedy to the issues between VCs and the entrepreneur relationship.

1.3 Smart contract

Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller directly written into lines of code. These contracts are stored on a blockchain and automatically enforce the terms of the agreement, as shown in Figure 2

The core premise of smart contracts is to automate the execution of agreements based on pre-defined conditions. By encoding legal contractual terms into computer code, enforcing these terms can be automated while reducing the risk of disputes (Taherdoost, 2023).

Fig. 2: Specific Investments and the Resulting Hold-Up Problem as a One-Sided Dilemma



Source: Own elaboration based on the previous research of Zhang and Liu (2022)

2 Synthesis of the existing concepts

This synthesis integrates the existing hold-up mechanisms into the smart contract framework (Jaakkola, 2020; Alvesson & Sandberg, 2023). The synthesis summary is provided in a structured Table 1.

Information Asymmetry: Traditional VC contracts rely on periodic, manual reporting, which can be manipulated. Smart contracts provide continuous, automated reporting, reducing asymmetry by ensuring all parties have real-time, accurate data.

Risk of Window Dressing: Manual reporting and verification in traditional contracts create opportunities for data manipulation. Smart contracts' automated verification processes minimise these risks by making data manipulation difficult.

Transaction Costs: Traditional VC agreements incur high costs due to extensive verification and monitoring processes. Smart contracts lower these costs by automating these processes, leading to more efficient transactions.

Trust and Transparency: Trust in traditional contracts relies on periodic audits and manual checks, which can be biased. Smart contracts foster higher trust levels through their immutable and transparent nature.

Enforcement and Compliance: Traditional contracts require manual enforcement of terms, leading to complexity and potential delays. Smart contracts automate enforcement, ensuring terms are upheld promptly and efficiently.

Control Rights: Control rights in traditional contracts are allocated through detailed covenants, which can be cumbersome. Smart contracts encode these rights directly into the contract, simplifying the process.

Monitoring: Traditional monitoring is periodic and can be biased. Smart contracts provide continuous and unbiased monitoring, enhancing oversight.

Tab. 1: Summary of the key aspects

Aspect	Traditional VC Contracts	Smart Contracts
Information Asymmetry	High, due to manual reporting	Low, due to automated transparency
Risk of Window Dressing	High	Low
Transaction Costs	High, due to verification needs	Lower, due to automation
Trust and Transparency	Moderate	High
Enforcement and Compliance	Manual and complex	Automated and streamlined
Control Rights	Allocated through complex covenants	Encoded in smart contracts
Monitoring	Periodic and potentially biased	Continuous and unbiased

Source: Own work based on research of Alharby and Van Moorsel (2017)

Conclusion

This study explored how smart contracts can mitigate hold-up problems, such as information asymmetries and window-dressing, in the venture capital space, thereby reducing entrepreneurial opportunism. The synthesis of smart contracts' listed efficiencies and benefits offers an apparent potential.

Despite the numerous advantages, however, multiple obstacles may still hinder their immediate implementation. These challenges are not exhaustive but do represent a source of immediate resistance. One of such challenges is the technical complexity involved in implementing such contracts, as it requires a high level of technical know-how, a deep understanding of blockchain technology, and trust in it. This may prove to be a significant hindrance for some venture capitalists. Secondly, legal and regulatory issues surrounding smart contracts vary from one jurisdiction to another, with global regulatory landscapes being at different levels of acceptance or maturity. There remains a lack of clarity surrounding blockchain and smart contract adoption. Another issue could be security concerns. Although blockchain technology is generally understood to be secure, smart contracts can be susceptible to vulnerabilities such as bugs and exploits if not correctly coded. Ensuring robust security measures is imperative for a well-working, smart contract. Lastly, integrating smart contracts with existing financial and operational systems will always be a complex and resource-intensive process.

However, integrating smart contracts in the venture capital business can transform the industry by addressing long-standing information asymmetry and trust issues. Nevertheless, successfully implementing this technology requires educating stakeholders on the benefits and workings of smart contracts, which is essential to facilitate adoption. In addition, developing standardized protocols for smart contracts can help streamline their implementation and integration with existing systems. Furthermore, collaboration with regulators to refine the existing legal procedure is essential. The venture capital community, stakeholders and legal experts must engage with regulatory bodies to develop clear legal frameworks for smart contracts that will provide legal certainty and encourage adoption.

This article provided several recommendations based on the existing theoretical concepts. An area for further research could be an empirical investigation into the potential for standardized approaches to smart contract standardization in venture capital, which would gauge the industry interest and prospective acceptance. Future researchers are also encouraged to document successful smart contract implementation cases for community inspiration.

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References

Alharby, M., & Van Moorsel, A. (2017). Blockchain-based smart contracts: A systematic mapping study. *Proceedings Computer Science Information Technology,* August, 2017, pp. 125–140.

Alvesson, M., & Sandberg, J. (2024). The art of phenomena construction: A framework for coming up with research phenomena beyond 'the usual suspects'. *Journal of Management Studies*, *61*(5), 1737-1765.

Bengtsson, O. (2011). Covenants in venture capital contracts. *Management Science*, *57*(11), 1926–1943.

Bienz, C., & Walz, U. (2010). Venture capital exit rights. *Journal of Economics & Management Strategy*, *19*(4), 1071-1116.

Che, Y. K., & Sákovics, J. (2004). A dynamic theory of holdup. *Econometrica*, *72*(4), 1063-1103.

Gompers, P. A. (1995). Optimal Investment, Monitoring, and the Staging of Venture Capital. *The Journal of Finance*, *50*(5), 1461–1489.

Han, J., Chen, M., Chen, Y., Jing, Q., & Wang, S. (2023). The study on the relationship between venture capital, tolerance to failure, and enterprise innovation performance. *Frontiers in Psychology*, *14*, 1133324.

Hielscher, S., Beckmann, M., & Pies, I. (2014). Participation versus Consent: Should Corporations Be Run according to Democratic Principles? *Business Ethics Quarterly*, *24*(4), 533–563.

Jaakkola, E. (2020). Designing conceptual articles: four approaches. *AMS Review*, *10*(1–2), 18–26.

Jiang, H., Cannella, A. A., & Jiao, J. (2018). Does desperation breed deceiver? A behavioral model of new venture opportunism. *Entrepreneurship: Theory and Practice*, *42*(5), 769–796.

Kaplan, S. N., & Strömberg, P. (2004). Characteristics, Contracts, and Actions: Evidence From Venture Capitalist Analyses. *The Journal of Finance*, *59*(5), 2177–2210.

Lauterbach, R., Welpe, I. M., & Fertig, J. (2007). Performance differentiation: cutting losses and maximizing profits of private equity and venture capital investments. *Financial Markets and Portfolio Management*, *21*(1), 45-67.

Roberts, M. R., & Sufi, A. (2009). Control Rights and Capital Structure: An Empirical Investigation. *The Journal of Finance*, *64*(4), 1657–1695.

Taherdoost, H. (2023). Smart contracts in blockchain technology: A critical review. *Information*, *14*(2), 117.

Vazirani, A., Sarkar, S., Bhattacharjee, T., Dwivedi, Y. K., & Jack, S. (2023). Information signals and bias in investment decisions: A meta-analytic comparison of prediction and actual performance of new ventures. *Journal of Business Research*, *155*, 113424.

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