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New Venture Capital Paradigm for the AI Era: Value Appreciation Rights Investment

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Abstract： The venture capital (VC) industry is generally facing long-term structural challenges in fundraising, investment, and capital exit. Information asymmetry and the absence of a fair valuation system are core pain points that hinder market liquidity in the VC industry. This paper proposes a novel value appreciation rights investment model, termed 'Value Appreciation Rights Investment. It is built upon blockchain and artificial intelligence (AI) technology and leverages blockchain to facilitate data confirmation, credible authentication of corporate value appreciation events, and the on-chain listing of earnings rights. Additionally, it employs AI technology to construct a valuation system, aiming to reduce subjective pricing biases. Meanwhile, this model emphasizes the long-term growth value of enterprises, aiming to alleviate the liquidity bottleneck of VC and provide new paths and references for addressing the structural exit issues in the VC industry.

Keywords: value appreciation rights investment; venture capital exit dilemma; blockchain technology; AI-enabled valuation

1. Introduction

1.1. Research Background and Meaning

With the acceleration of global economic development and scientific and technological innovation, artificial intelligence (AI) has become one of the most dynamic fields in the world, and the social value of entrepreneurial activities is increasingly prominent. However, the venture capital (VC) industry is generally facing multiple difficulties in terms of fundraising, investment deployment, and exit mechanisms, especially the uncertainty of the growth and development of start-ups and the intensity of market competition. This also leads to investors usually facing higher investment risks. Because start-ups take time to build their brands, expand their markets, and generate profits, the return cycle of entrepreneurial investment is long. At the same time, information asymmetry and problems such as the difficulty of screening high-quality projects may further exacerbate the uncertainty of investment.

Against this background, as an emerging investment model, the value appreciation rights investment focuses on the value-added potential and long-term value of enterprises while helping entrepreneurs secure financing more conveniently; it can also allow investors to reduce investment risks and provide a relatively stable, long-term return on investment. The core technologies behind this innovative investment model are covered by a Chinese national invention patent, titled Innovative Enterprise Value Appreciation Rights Investment Trading Platform Based on Blockchain and AI Technology (Patent No.: ZL 2019 1 0838718.0). This patent not only validates the practical feasibility of the proposed model but also offers a robust technical foundation for translating the concept into practice.

At the technical level, the technologies of blockchain and AI serve as the fundamental technical support for the practical implementation of this innovative model. Specifically, the decentralization and tamper-proof attributes of blockchain can substantially enhance the transparency and credibility of VC information, effectively resolving credit frictions throughout the financing, investment, and exit processes. Meanwhile, AI technology optimizes corporate valuation mechanisms and improves the scientific rigor and rationality of investors' decision-making. The integration of cutting-edge technological empowerment in the AI era and the innovative value appreciation rights investment model is poised to forge a novel paradigm tailored to the high-quality development of the VC industry.

1.2. Current Status of the VC Industry: Evidence from China

1.2.1. Definition of Venture Capital

Venture capital investment refers to a form of private equity (PE) investment that injects equity capital into unlisted startups or high-growth enterprises. Then, investors realize capital gains through capital exit channels, such as corporate initial public offerings (IPOs) and mergers & acquisitions (M&As) [1]. Since the profit of VC is mainly from capital gains, investors should focus on the high-growth potential of investee enterprises.

The concept of VC was formally introduced in China in 1985, and this industry has since undergone stages of initial exploration, institutional standardization, and rapid expansion. After 2015, it entered a rational adjustment phase. The successive launch of the ChiNext Board, STAR Market, Beijing Stock Exchange (BSE), and the full implementation of the registration-based IPO system have further standardized the development of China's VC industry [2].

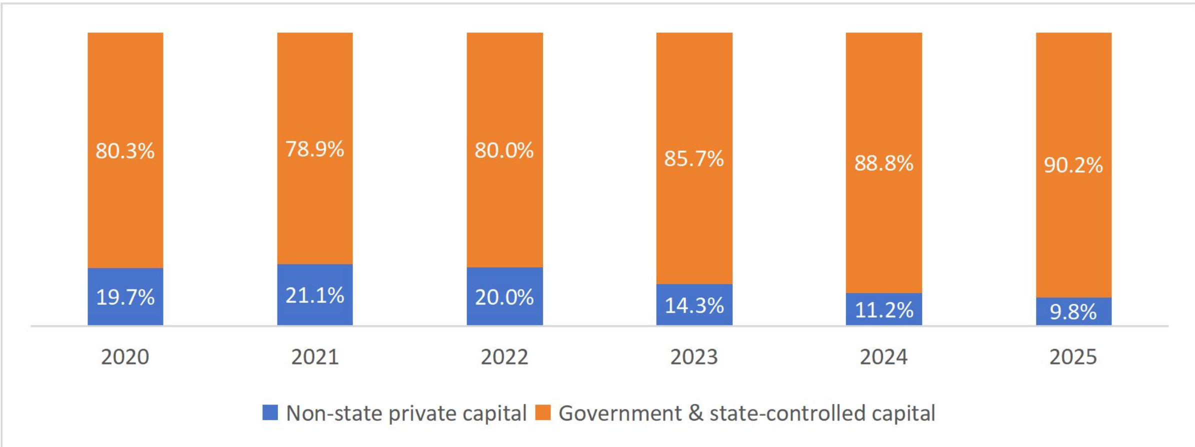
1.2. 2. Core Characteristics of China's Current Venture Capital Industry

Firstly, China's VC industry shows a prominent trend of state-owned capital dominance on the fundraising side. According to data from ZERONE[3], the proportion of state-owned capital sources, including government funds and state-controlled institutional capital, has consistently remained above 80% in recent years and exceeded 90% in 2025, while capital contributions from private individuals and market-oriented institutions have continued to shrink (see Figure 1).

Limited partners (LPs) with state-owned capital backgrounds need to comply with regulatory requirements for maintaining and increasing the value of state-owned assets [4], which leads them to adopt risk-averse investment preferences.

Investment decision-making must undergo multi-level examination and approval by departments, groups, boards of directors, party committees, and other bodies, which makes the process lengthy. Furthermore, they tend to prefer investing in mature projects at later stages, while high-risk angel- and seed-stage enterprises are rarely considered. It objectively increases the financing difficulty of early innovative enterprises and has a significant impact on the whole VC industry.

Figure 1. Proportion of capital types in China's PE market (2020–2025)



(Data Source: ZERONE [3])

Secondly, the industry is trapped in three core bottlenecks: difficulties in fundraising, investment deployment, and capital exit.

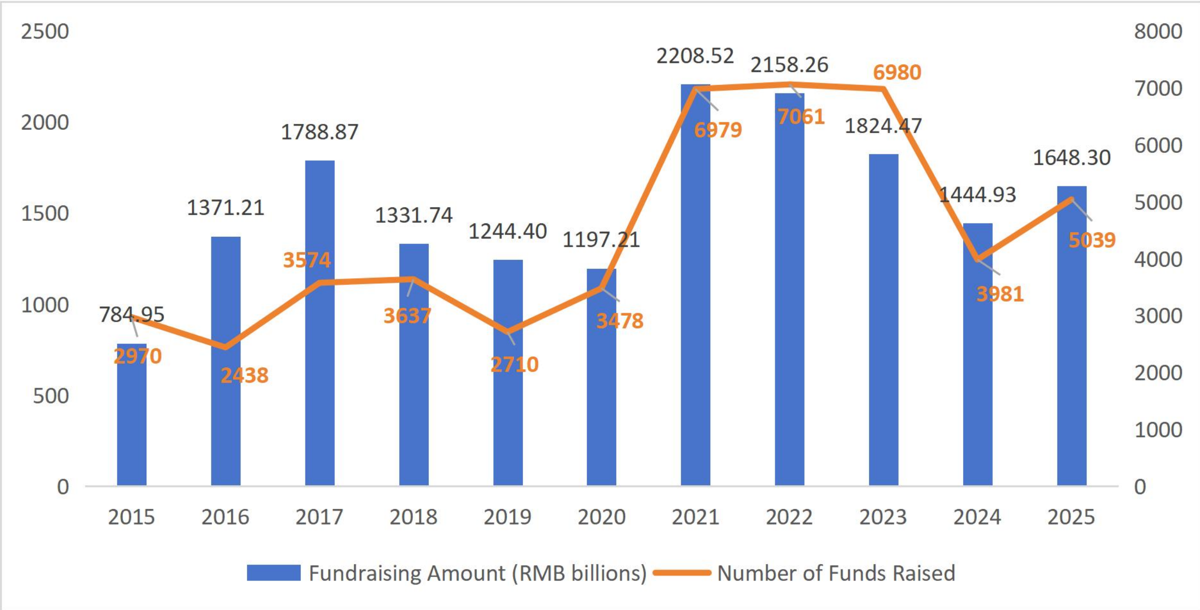
(1) Fundraising dilemma: the shortage of long-term capital and shrinking market liquidity

From 2015 to 2020, the scale of China's equity investment fundraising reached a high of 1.79 trillion yuan in 2017 and then declined for three consecutive years. The scale of fundraising peaked over the past decade, reaching over 2.2 trillion yuan in 2021, but has declined year by year since then, reaching a low point in 2024, with the scale decreasing by about 20.8% year-on-year (see Figure 2).

The structural fundraising predicament stems from four main factors:

One is the weakening of macroeconomic expectations, global geopolitical conflicts, and economic downturns that have depressed the internal rate of return and exit returns of VC institutions, which have reduced the willingness to invest. Second, there is a lack of a long-term capital access mechanism, and the new regulations on asset management restrict the entry of bank wealth management funds and government funds. Together with the triple constraints of high return-on-investment requirements, administrative intervention, and financial budget fluctuations, these factors lead to insufficient stability of funds [5]. Third, the channels for capital withdrawal are limited, which in turn inhibits fundraising. Investors are concerned about their funds being locked up for long periods, thereby reducing their willingness to invest additional funds. Fourth, investors' investment preferences have become more rational, and their expectations for returns are also more realistic and conservative. This has made investors more cautious about investing.

Figure 2. Equity investment fundraising scale in China (2015–2025)



(Data Source: Zero2IPO Research Center [6])

(2) Investment dilemma: insufficient corporate innovation, scarcity of high-quality investment targets, and resource concentration among leading institutions

According to data from the National Bureau of Statistics of China [7], basic research expenditure accounted for 7.08% of China's total R&D investment in 2025, representing a year-on-year increase of 1.07 percentage points. On the other hand, this figure remains far below the average level of OECD countries, which is 15%–20% [8]. While nearly 80% of China's R&D funding is sourced from domestic enterprises, corporate investment in basic research has long been severely inadequate [8]. From 2010 to 2023, experimental development expenditure occupied an average of 96.62% of total corporate R&D spending, whereas basic research expenditure consistently stayed below 1% [8] (See Figure 3）. This shows that the structural imbalance results in a scarcity of original innovation achievements and high reliance on foreign core technologies.

Although China is a global manufacturing powerhouse [9], the number of small and medium-sized enterprises with sustainable high-growth capabilities and solid technological moats is limited, leading to a shortage of high-quality investment targets in the primary market. Furthermore, information asymmetry prevails throughout the pre-investment due diligence process. Startups often obscure operational risks and embellish financial data without credible third-party data verification, driving up institutional due diligence costs and triggering pervasive subjective valuation biases.

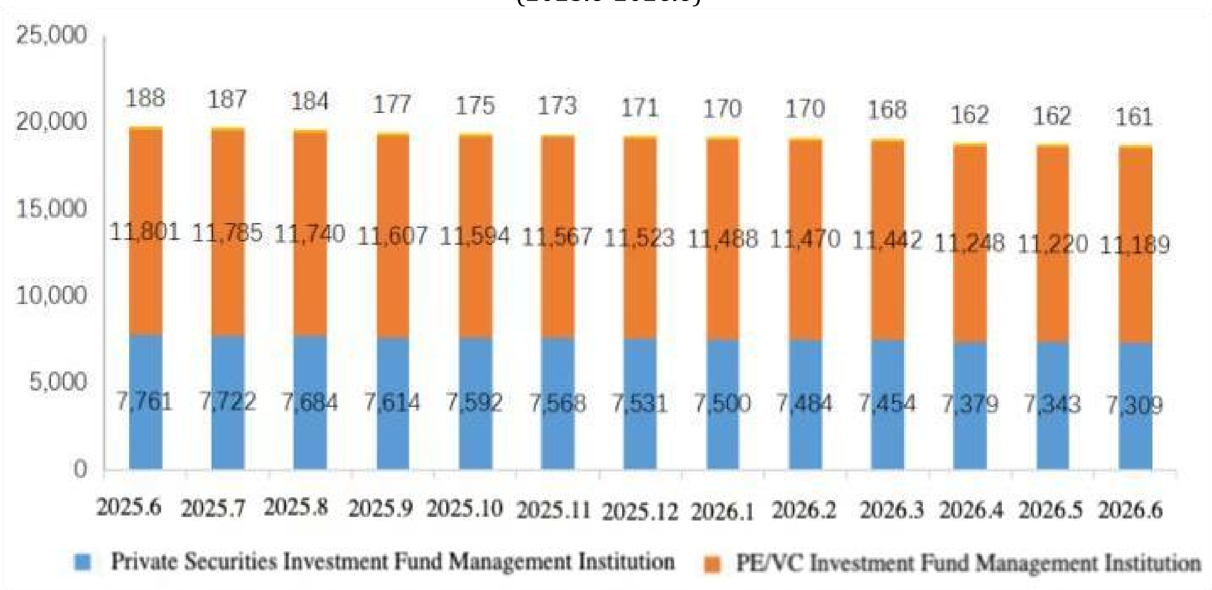
Figure 3. Corporate R&D expenditure in China, the United States, and Japan (2010–2023)

Year	China			USA			Japan		
	Basic Research	Applied Research	Experimental Development	Basic Research	Applied Research	Experimental Development	Basic Research	Applied Research	Experimental Development
2010	0.08	2.43	97.48		—		6.9	19.3	73.8
2011	0.11	2.9	96.99	5.64	16.44	77.92	6.6	19.1	74.4
2012	0.09	3.05	96.86		—		6.7	18.8	74.5
2013	0.09	2.75	97.16	7.14	15.57	77.29	6.9	18.6	74.5
2014	0.1	3.13	96.77		—		6.7	17.4	75.8
2015	0.1	3.03	96.87	6.82	15.53	77.66	6.7	17.2	76.1
2016	0.21	3.04	96.75		—		7.5	16.7	75.9
2017	0.21	3.21	96.58	6.91	15.4	77.69	8.3	16	75.7
2018	0.22	3.8	95.98		—		7.8	16.5	75.7
2019	0.3	3.31	96.39	7	15.21	77.79	7.6	16	76.4
2020	0.51	3.03	96.46		—		7.4	15.9	76.7
2021	0.78	3.28	95.94		—		7.5	16.1	76.4
2022	0.73	3.34	95.93	7.14	14.68	78.18	6.9	15.6	77.5
2023	0.72	2.77	96.51		—		6,9	15.7	77.4

(Data Source: Chen et al [8])

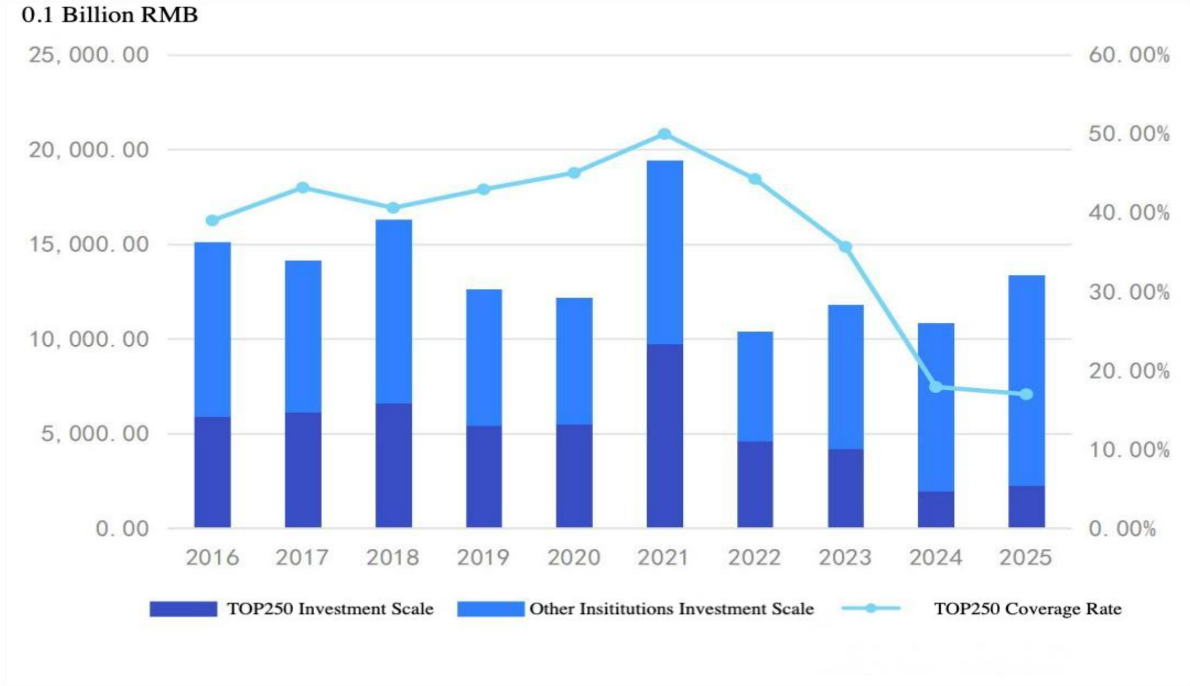
On the other hand, the Matthew effect in the VC industry has intensified continuously. As reported by China Fund News (2026)[10], as of June 2026, the number of active PE and VC fund managers in China is 11,189, a decrease of 5.19% in the last year, with a consistent downward monthly trend reflecting the continuous exit of small and medium-sized investment institutions (See Figure 4). Meanwhile, market transactions are highly concentrated among the top 250 industry institutions. In 2025, 734 investment entities under these leading institutions completed market deployments, accounting for only 7.7% of the industry's total 9,487 institutions, yet representing a 16.69% year-on-year increase. In terms of capital deployment, 17% of leading institutions account for 28% of market projects. High-quality capital and project resources continue to converge at the top of the industry (See Figure 5), squeezing the development space of small and medium-sized institutions [11].

Figure 4. Monthly data of active PE and VC fund managers in China (2025.6-2026.6)



Note: The top 250 institutions are those consistently listed in China's Top 100 VC Institutions, Top 100 Private Equity Institutions, and Top 50 Early-Stage VC Institutions rankings. (Data Source: China Fund News [10])

Figure 5. Investment scale and market coverage of Top 250 institutions in China (2016–2025)



(Data Source: Li, 2026 [11])

(3) Exit dilemma: limited channels of capital exit, and absence of fair valuation mechanisms

The primary channels of capital exit for China's VC market include IPO share reduction, M&A, equity repurchase, liquidation, and secondary fund (S-fund) transfers. Among these, M&A, repurchase, and S-fund transfers remain underdeveloped, leaving IPOs as the dominant exit route. However, IPO exits are constrained by high listing thresholds, long lock-up periods, and policy fluctuations. Strengthened secondary market supervision will further restrict IPO exit efficiency in the future [12].

The fundamental causes of exit difficulties fall into two categories. The first is the widespread information asymmetry and insufficient market credibility. False corporate disclosures and breached performance commitments lack credible on-chain evidence, creating substantial obstacles for accountability and evidence collection. The second is that the industry lacks a sound fair valuation system. Without secondary market pricing for startups, traditional valuation methods rely heavily on subjective professional judgment, leading to persistent value divergence between buyers and sellers and low equity transaction completion rates.

The common cause of the aforementioned industry dilemmas lies in the inherent flaws of traditional equity investment models. Treating overall corporate equity as an indivisible trading unit fails to identify and price the value of phased value appreciation events during enterprise growth, ultimately resulting in depleted asset liquidity and ineffective pricing mechanisms. To address these structural pain points, an innovative trading model that enables credible recording and quantitative valuation of corporate value growth is urgently needed. In this context, the value appreciation rights investment model, empowered by blockchain-based right confirmation and AI quantitative valuation, provides a viable solution to break the industry deadlock.

2. Value Appreciation Rights Investment: A New Paradigm to Resolve VC Dilemmas

Value appreciation rights investment refers to a model in which investors purchase the rights to share in future gains generated by corporate value-added events. It creates an opportunity for entrepreneurs to share in the value growth of emerging ventures, while providing relatively stable financial support for investors. Meanwhile, this model focuses on firms with long-term growth potential and enables investors to claim partial benefits from future value increases, rather than relying solely on traditional equity ownership.

Compared with traditional equity investment, which takes the overall equity of the enterprise as the transaction target, the core concept of value-added investment focuses on the substantial value-added events arising from the growth of enterprises, such as the authorization of invention patents, signing contracts with key customers, the gradual growth of revenue, and the acquisition of industry qualifications. These are regarded as independent, verifiable, priceable, and transferable asset units. Investors only need to hold the right to receive future profit distributions, and they can obtain corresponding returns when the enterprise achieves value-added results.

2.1. Core Characteristics of This Model

(1) Lower market entry thresholds

In this model, investors do not need to raise large amounts of capital to purchase the overall equity of the enterprise and can subscribe to and increase their share on demand. Thus, it lowers the threshold of primary market investment and provides a more convenient channel for market-oriented long-term capital to enter the field of VC.

(2) More stable investment

This model essentially provides growth-oriented capital for startups. Investors gain returns as the company gradually realizes value appreciation, rather than pursuing short-term speculative profits. Such a value-oriented investment philosophy guides firms to focus on steady and sustainable development while enabling investors to obtain stable, lower-risk long-term gains.

(3) Emphasis on joint value creation

When selecting investment targets, investors comprehensively evaluate a firm's technological innovation capabilities, market prospects, and business sustainability to identify untapped growth potential. Instead of simply providing passive capital support, investors and entrepreneurs work together to explore market opportunities, optimize operational strategies, and jointly create corporate value, thereby achieving mutually beneficial results.

(4) Risk-sharing mechanism

Investors and entrepreneurs jointly bear investment risks and form a risk- and benefit-sharing mechanism. Investors provide financial support to help entrepreneurs turn their ideas into actual businesses. At the same time, they also bear the corresponding investment risk. With investors' support, entrepreneurs can better cope with capital constraints in the early stages of entrepreneurship. This mechanism helps stimulate the innovative vitality of entrepreneurs and improve the success rate of entrepreneurial ventures.

2.2. Major Profit Generation Mechanisms

(1) Fixed interest income model

Investors receive fixed interest income at an agreed interest rate by investing in enterprises. This form is similar to debt investment, but investors obtain investment returns from the enterprise according to the agreed interest rate, rather than directly holding the equity of the enterprise.

(2) Franchise right income model

In exchange for capital injection, investors obtain exclusive franchise rights covering specific business segments or geographical regions. Investors can obtain continuous investment returns by collecting franchise fees and operational royalties from the investee company.

(3) A future revenue right (RBF model)

Investors provide capital in exchange for the right to share a certain proportion of the firm's future revenue within a specific period or business scope. Revenue-Based Financing (RBF) is a typical example of this model, which allows enterprises to repay investors based on actual operating cash flow rather than fixed interest payments or equity dilution.

Compared with traditional debt financing, RBF returns are dynamically linked to corporate operating performance. During economic downturns, it reduces corporate repayment pressure, and in industry booms, it enables investors to gain excess growth returns. This flexible profit distribution mechanism better matches the growth characteristics of innovative enterprises.

2.3. How Value Appreciation Rights Investment Solves VC Industry Structural Dilemmas

This investment model can simultaneously solve the pain points of fundraising, investment, and exits in the VC industry. On the one hand, it reduces the minimum investment threshold, attracts more market-oriented long-term capital to share the growth benefits of enterprises with a lower threshold, and broadens fundraising channels. Meanwhile, it integrates multi-node exit designs to shorten the lock-up period of capital and further improve LPs' willingness to invest.

On the other hand, the investment model requires enterprises to carry out structured evidence storage and hierarchical authentication for value-added events, and promote the transformation of enterprises' unilateral information statements into reliable on-chain deposit certificates. It can effectively mitigate problems such as information asymmetry, due diligence costs, and biases in human valuation. Meanwhile, it breaks with the traditional heavy reliance on IPO exits and builds diversified exit channels for cashing in on value-added events. Enterprises do not need to go public, and investors rely on key milestones such as order placement, patent authorization, and revenue milestones to complete partial withdrawals, which can significantly alleviate exit pressure.

2.4. AI Empowerment for the Development of Value Appreciation Rights Investment

The core external driving force of value appreciation rights investment is the breakthrough development of AI technology, which has enabled the model to move from theoretical concept to practical application. On the other hand, the integration of AI and the VC industry is not just a tool iteration, but a fundamental change in the cognitive paradigm of the industry. It is revolutionizing the information processing methods, valuation logic, and risk pricing systems of the VC industry. Traditional decision-making in the VC industry normally relies on experience and fragmented information, which is highly subjective and limited.

AI can transform experience into systematic intelligence and achieve full information coverage in pre-investment research and judgment through structured, in-depth learning from massive industry data, investment and financing cases, and enterprise financial information.

In terms of value judgment, AI enables VC to shift from traditional after-the-fact result verification to the pre-probability prediction of multi-dimensional data signals. This method overcomes the limitation of the traditional single-point valuation of enterprises as a whole and provides technical support for split pricing and independent trading for value appreciation rights investment. Furthermore, AI does not replace human decision-making; rather, it makes the implicit knowledge of the VC industry quantifiable and calculable. Therefore, AI provides a solid technical foundation for the engineering implementation of value appreciation rights investment.

3. Blockchain and AI: Technical Foundations for Deploying Value Appreciation Rights

The institutional root cause of the VC dilemma described above can be attributed to the absence of a trust mechanism and the failure of the pricing system. This structural problem lacked fundamental solutions before the era of AI, since, as enterprise value increased, value-added events could not be independently verified, the assessment of early enterprise value relied on personal subjective judgment, and there was no fair pricing anchor for the transfer of non-listed equity. However, the emergent capabilities of AI large models have enabled machines to possess cross-domain knowledge transfer and complex pattern recognition capabilities, while the consortium chain provides a decentralized and immutable data verification infrastructure. The convergence of AI and blockchain technology is changing the boundaries of these constraints, making it possible for value appreciation rights investment to move from theory to practice. In the following, we will systematically elaborate on the technical foundations of this new paradigm from the perspectives of blockchain and artificial intelligence.

3.1. Blockchain Technology: Right Confirmation and Trustworthy Recording of Value Appreciation Events

3.1.1. Definition of Blockchain and the Advantages of Consortium Chains

According to the White Paper [13] on China's Blockchain Technology and Application Development, published by the Ministry of Industry and Information Technology (2016), blockchain in a narrow sense refers to a distributed ledger formed by connecting data blocks in chronological order and creating a chain structure, and relying on cryptography to ensure that data is not tampered with or forged. In a broad sense, blockchain is a new type of distributed computing paradigm that integrates the data structure of blockchain, the consensus algorithm of distributed nodes, the encryption security mechanism, and the automated script code.

On the one hand, blockchain can be summarized by five core traits. These include decentralization, whereby the network runs collectively without a single controlling party; transparency, allowing public verification of system rules and data hashes; autonomy, which removes reliance on outside intermediaries; cryptographic security for data integrity; and granular privacy control to manage permissions over identity authentication and data access. On the other hand, consortium chains, as a technical form between fully open public chains and single-entity-controlled private chains, possess the following three characteristics that are highly compatible with the venture capital business:

- Identity trustworthiness. All participating nodes (such as enterprises, funds, intermediaries, regulatory agencies, etc.) must undergo real-name CA identity authentication before joining, which fully complies with the compliance requirements of the venture capital industry for the qualification review of participating entities.
- Permissioned hierarchy. Different nodes are granted differentiated data read and write permissions as well as consensus participation permissions, which aligns with the venture capital business practice of "enterprise core business data being disclosed only to qualified investors".
- Regulatory access. Consortium chains can set up a regulatory node with the highest auditing authority to achieve look-through supervision without interfering with daily operations, meeting the balance requirements between financial innovation and risk prevention.

3.1.2. Core Blockchain Architecture Underpinning Value Appreciation Rights

Blockchain technology can meet the three core requirements of the value appreciation rights investment model. First, the credibility of identity and data, ensuring that the entities reporting the appreciation events are genuine and accurate, and that the data has not been tampered with; second, achieving commercial consensus, that is, forming a unanimous judgment on whether appreciation has occurred; third, enhancing the efficiency and verifiability of evidence storage, that is, investors can verify the authenticity of the appreciation events without obtaining all the data.

The detailed mechanisms are shown as follows:

(1) Identity credibility and data sovereignty: resolving barriers to information disclosure

Information asymmetry persists widely in VC partly because companies fear leaking sensitive operational data and hesitate to disclose information comprehensively. Consortium chains ease these concerns via two core design mechanisms.

For identity authentication, the network adopts an X.509-compliant PKI certificate system. Every node receives three sets of digital credentials: node certificates, transaction certificates, and communication certificates. The system supports multiple encryption standards, including domestic cryptographic algorithms SM2/SM4 alongside RSA. All operations carried out on the chain are tied to a verified unique identity, eliminating the risk of anonymous malicious behavior at the source.

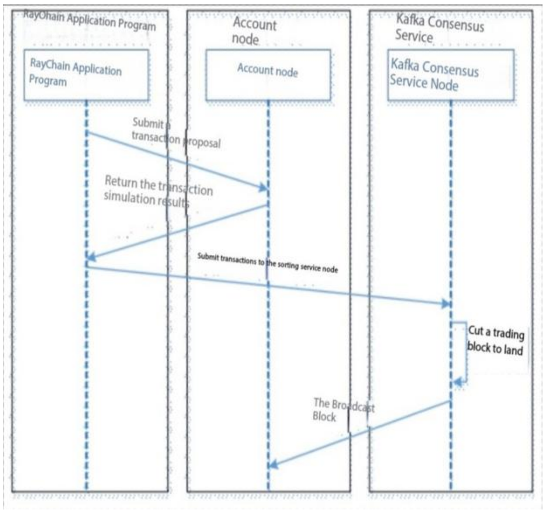
In terms of data sovereignty and privacy protection, the governance principle that data ownership belongs to the data-generating party has been established: the original data of value-added events uploaded by enterprises will be encrypted and stored using their public keys, and unauthorized third parties cannot view the plaintext content. When an institution requests consultation, it must first go through the process of ‘data owner authorization → the owner then encrypts the data using the applicant's public key → the applicant's private key completes the decryption’; all authorization and access operations are realized through blockchain certificates. In addition, zero-knowledge proof and homomorphic encryption technologies have been introduced, enabling third parties to verify the authenticity of assets without obtaining the plaintext financial data.

(2) Pluggable consensus mechanism: business adaptation that balances performance, security, and cost

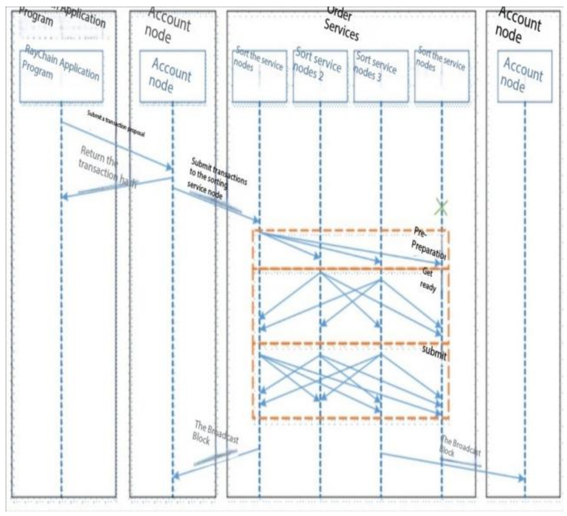
In the blockchain system, the consensus mechanism addresses the issue of how multiple participants can reach an agreement on a certain state. Different industries have different requirements for the reliability, throughput, fault tolerance, and operating costs of consensus. The value appreciation rights investment mainly involves the following three scenarios: large-scale recording of value-added events (with a daily volume possibly reaching thousands), high-value single value-added rights transfer transactions (with large single transaction amounts and extremely high requirements for security), and regulatory compliance audits (which require that the data cannot be tampered with by any party).

However, a single consensus mechanism is difficult to simultaneously meet these three major requirements optimally. Nevertheless, the blockchain can provide support through plug-in universal solutions, such as Kafka consensus, Practical Byzantine Fault Tolerance Algorithm (PBFT), Solo, and Raft, etc., and enable control over consensus processes such as transaction verification and transaction ordering services (see Figure 6).

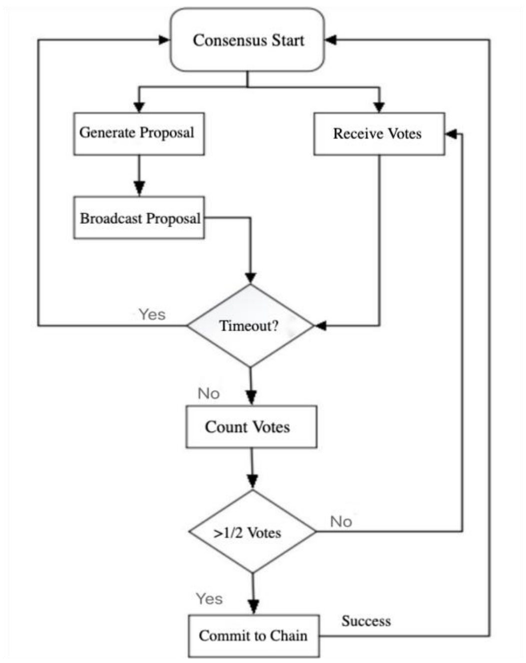
Figure 6. Mechanism comparison of four consensus algorithms



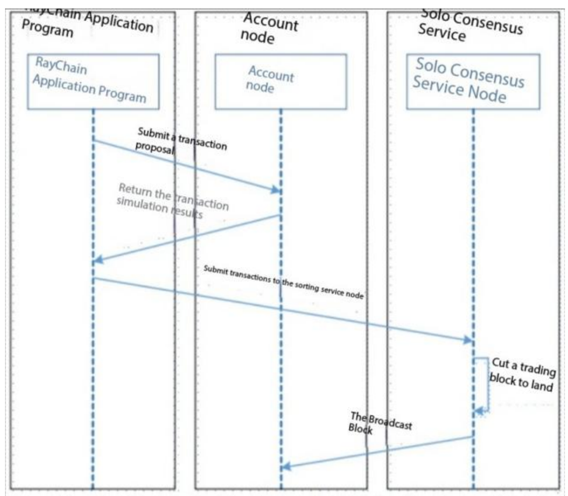
Kafka Consensus



PBFT Consensus



Raft Consensus



Solo Consensus

These four consensus algorithms can be dynamically switched according to the business scenario. As shown in Figure 6, Kafka and PBFT respectively focus on high throughput and high security, while Raft and Solo are in between. The design of this blockchain system breaks the rigid constraint of "single chain, single consensus". This flexible architecture enables the underlying infrastructure to be flexibly expanded according to business needs, without sacrificing efficiency in pursuit of ultimate security or relaxing necessary risk control constraints in pursuit of higher throughput.

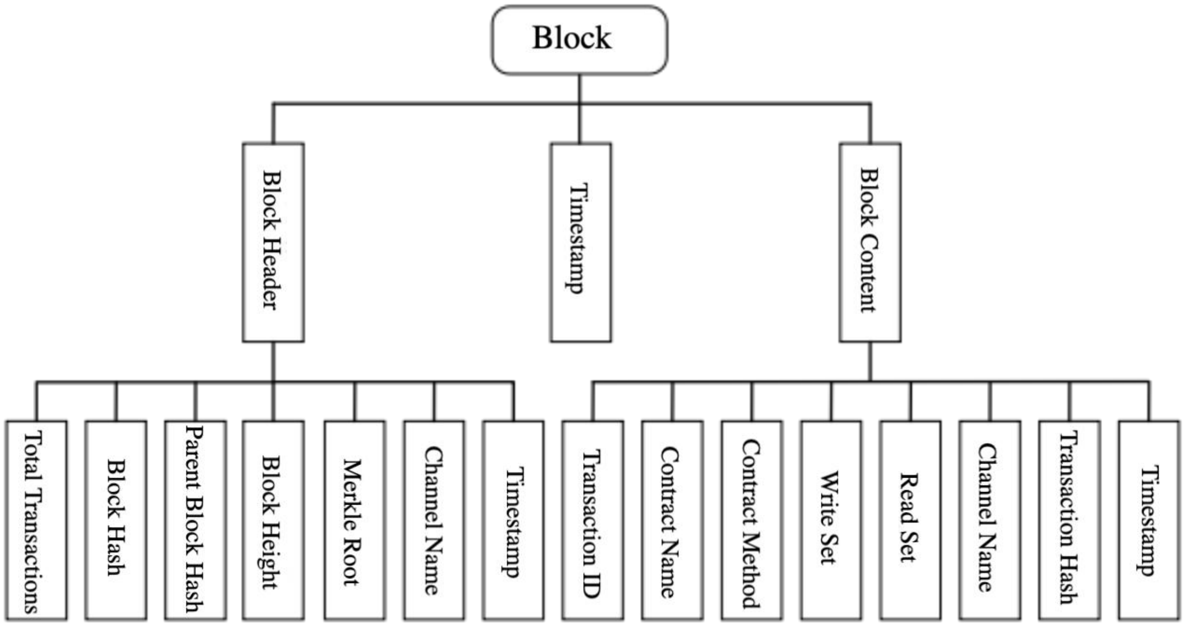
(3) Distributed ledger and deposit certificate of Merkle tree: the unity of anti-tampering and efficient verification

The distributed ledger addresses three core issues: how to structure the data of value-added events, how to ensure its immutability, and how to achieve efficient verification. At the data structure level, each block consists of the block header (the hash value of the previous block, the Merkle root hash, the timestamp, and the block height) and the block body (a list of transactions). The hash value of the previous block combines all the blocks into a chain structure, which means that any modification to the content of historical blocks will change the corresponding hash value, causing the hash chain of all subsequent blocks to break. This ensures that if the data is tampered with, it can be detected at the data structure level.

At the verification level of the value-added events, a Merkle tree structure is constructed within the block body. That is, the evidence of each value-added event corresponds to a transaction hash. All the transaction hashes are matched pairwise from the bottom up and hierarchically hashed, ultimately generating a unique Merkle root hash that is stored along with the block header. The key to this design lies in the fact that a third party does not need to download the entire block but only needs to obtain the hash value of a single transaction, the Merkle path (i.e., a series of hash paths from the transaction hash to the root hash), and the root hash. With these three pieces of information, a third party can quickly verify whether the evidence certificate has been tampered with (as shown in Figure 7).

For the investors of value appreciation rights, this mechanism enables them to independently conduct low-cost verification of the authenticity of a single value-added event without accessing the complete business data of the enterprise.

Figure 7. Schematic diagram of blockchain and block structure



Note: Each block consists of a block header (previous block hash, Merkle root hash, timestamp, block height) and a block body (transaction list and Merkle tree). The Merkle tree generates a root hash by iteratively combining all transaction hashes from bottom to top. Third parties only need the target transaction hash, Merkle path, and root hash to complete verification, and full block data download is unnecessary.

(4) Commercial Application of On-Chain Archiving

Based on the aforementioned technologies, long-term value-added events—such as R&D breakthroughs, order signing, patent authorization, government subsidies, and revenue growth—can generate a unique on-chain hash deposit certificate (ID) containing timestamps, subject identity information, and supporting materials. Meanwhile, the blockchain browser supports full life-cycle tracing of any value-added event through the deposit ID, from upload time and authentication level to authorized access records. The system also supports a multi-chain isolation architecture, whereby value-added data of different industries or enterprises with different levels of confidentiality can be stored on independent chains to avoid the risk of cross-industry data leakage.

The smart contract layer further encodes business rules. Terms including revenue sharing ratios linked to value appreciation, revenue trigger thresholds, and profit-sharing arrangements following IPOs or M&A deals can be pre-written into smart contracts. When on-chain data satisfies preset conditions, the capital transfer will be automatically executed. This can eliminate the moral hazard, seen in traditional arrangements, whereby enterprises hide income to reduce distributions.

3.2. AI Technology: Dynamic and Fair Pricing for Value Appreciation Rights

3.2.1. Limitations of Conventional Valuation in VC Practice

Enterprise value evaluation is the core component of investment decision-making in the venture capital industry. Traditional valuation methods can be divided into two categories: one is the relative valuation method, which uses the transaction prices of comparable companies in the market as a reference; the other is the absolute valuation method, which calculates the discounted present value of the enterprise's future cash flows.

However, the common premise of these two methods is that the valued enterprise has entered a relatively stable development stage and has available historical financial data and comparable targets.

However, for enterprises in fields such as hard technology, biomedicine, and semiconductors, which are in the early stages and lack profit records, or have not even generated stable revenues, their technical paths have not yet been verified by the market. Therefore, they cannot obtain the parameter data, such as cash flows or mature comparable companies, that are relied upon by traditional valuation models. Under the current conditions, valuation is highly dependent on investors' investment experience and subjective judgment, which is precisely the fundamental reason for the lack of fair pricing at the technical level.

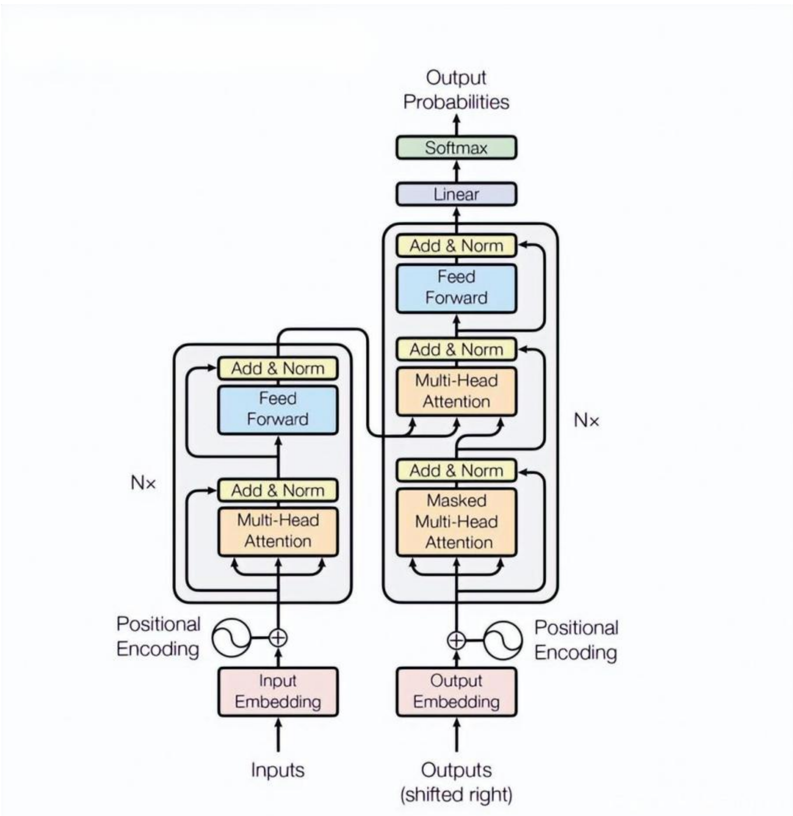
3.2.2. AI machine learning drives value-added events pricing

The emergent capabilities of AI large models provide theoretical support for this model. Research shows that when the model training volume is less than 10^{22} floating-point operations, the accuracy rate of several natural language processing tasks is close to zero; but when the training volume crosses the threshold of 10^{22} times, the accuracy rate of tasks shows a dramatic increase [14]. This shows that a large model that reaches a sufficient training scale is able to independently develop reasoning abilities that are not explicitly marked in the training data.

In the VC scenario, when the AI model has absorbed a large amount of industry knowledge, the key factors of enterprise value-added need not be manually preset; they are independently discovered during model training. For example, the complex interactions among variables such as the number of patents, order quality, and R&D investment, and their influence on the final valuation and value-added of the enterprise, can be captured, making the pricing more scientific.

Large language models built on the Transformer architecture further extend these capabilities. The Transformer structure incorporates multi-head attention mechanisms, residual connections, layer normalization and positional encoding. Its core innovation lies in the self-attention mechanism, which captures long-distance correlations between any positions within input sequences [15]. This characteristic enables it to identify weak signals of distant correlations when dealing with cross-industry and cross-stage investment and financing texts as well as structured data. For instance, a policy change in a specific industry segment may affect the order growth of related companies two years later, and subsequently influence the pricing of their value appreciation rights. (See Figure 8)

Figure 8. The architecture schematic of a transformer



(Source: Vaswani et al.[15])

3.3. Synergistic Empowerment: Blockchain and AI Working in Tandem

The on-chain verification mechanism of blockchain provides reliable training data and a verification basis for the AI valuation model. The enterprise value-increase events in the investment and financing cases learned by the AI model have all undergone multiple verifications, and their authenticity can be traced on the blockchain. The AI model outputs dynamic valuation results for each increase event, and then stores them as hashes back onto the blockchain, becoming the pricing benchmark and historical reference for subsequent value appreciation rights transfers. Each new investor can view the historical valuation trajectory and transaction price of this value increase event, shifting pricing negotiations from subjective experiential judgment to a scientific basis.

It can be seen that blockchain and AI do not operate independently in separate segments of value appreciation rights investment. Instead, they create a self-reinforcing positive cycle that is 'trusted data → fair valuation → traceable transactions → permanently auditable records'. Together, they constitute the core technical infrastructure that enables value appreciation rights investment to evolve from theoretical research toward large-scale commercial application.

4. Conclusion

Traditional equity investment targets the overall equity of an enterprise as the transaction target. It suffers from issues such as information asymmetry, subjective valuation, and a single exit channel, which have led to numerous difficulties for the venture capital industry in terms of financing, investment, and capital exit, thereby restricting the long-term healthy development of the industry. In an era of continuous artificial intelligence advancement, the value appreciation rights investment model relies on artificial intelligence and blockchain technology to solve the problems of investment and financing. By addressing the underlying trust flaws, it achieves dynamic and fair valuation of the enterprise, eliminates pricing divergence, and provides a basis for rational and scientific investment.

From the perspective of industry value, the value appreciation rights investment model is expected to lower the investment threshold in the financing sector and attract market-oriented long-term capital; in the investment sector, it reduces information asymmetry, precisely identifies value-added opportunities in specialized fields such as hard technology, and enriches the resource supply in the exit sector. It expands the targets of secondary market transactions and broadens the multi-level exit channels. By effectively combining technological innovation and the venture capital industry, it enhances the value appreciation rights investment model and helps the venture capital industry enter a new stage of digitalization and intelligence in the era of artificial intelligence.

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