

The Impact and Challenge of Digital Infrastructure Construction on Investment and Financing Term Mismatch of Enterprises

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Abstract

With the emergence of the digital age, digital infrastructure has witnessed significant development. Through literature review, summarization, and exemplification, this paper examines the impact of digital infrastructure construction on the maturity mismatch of enterprise investment and financing. The research reveals that the network infrastructure and information service infrastructure within digital infrastructure can respectively reduce the risk of investment and financing term mismatch by alleviating the impact of information asymmetry and by obtaining the support of big - data - based information, enabling enterprises to make more precise decisions. This paper also highlights several issues that require attention during the process of digital infrastructure construction, such as technological updates and data security. The research in this paper is conducive to understanding the mechanism through which digital infrastructure affects the mismatch of enterprise investment and financing terms and the risk alerts associated with digital infrastructure establishment, and provides relevant policy incentives for enterprises utilizing digital infrastructure.

Keywords

Digital Infrastructure; Investment and Financing Term Mismatch; Information Asymmetry.

1. Introduction

Advanced digital technologies including artificial intelligence, big data, and cloud computing have deeply transformed the pattern of economic development. Even under the impact of COVID - 19, the scale of China's digital economy reached 39.2 trillion yuan in 2020, accounting for 38.6 percent of the total GDP. Undoubtedly, the digital economy has become a crucial driving force [1] for sustainable economic growth. Currently, many enterprises in China are faced with the problem of mismatch between investment and financing periods, which may lead enterprises to encounter the situation [2] of capital shortage. Meanwhile, human society is actively undergoing digital transformation in pursuit of a new leap. Digital infrastructure construction serves as a solid foundation for the development of the digital economy, accelerating the integration of computing and network and opening up the "main artery" of information. It has promoted industrial innovation and technological integration [3]. Nowadays, digital infrastructure has been closely associated with people's lives and work, providing solid support for social and economic development and industrial structure, and holds significant potential to alleviate corporate financing constraints. The "Broadband China" demonstration city policy has effectively reduced the index [4] of corporate financing constraints. Based on the analysis of the impact of digital infrastructure on the misallocation of investment and financing terms of enterprises, we can not only understand the financial role of digital infrastructure from a practical perspective and its impact mechanism to provide enterprises with insights into the establishment of digital infrastructure, but also facilitate an understanding of the

microeconomic effects of digital technology development and offer a reference basis for policymakers to optimize the allocation of financial resources.

2. Relevant Theoretical Basis

2.1. Digital Infrastructure

Digital infrastructure constitutes an infrastructure system propelled by data innovation, which is founded on communication networks and has data computing facilities at its core. It encompasses both novel information infrastructure and certain traditional physical infrastructure that has undergone digital transformation. It can be categorized into four types: network infrastructure, information service infrastructure, computing support infrastructure, and new infrastructure. Among these, network infrastructure and information service infrastructure are the principal ones that have the potential to influence the investment, financing, and financial decision-making processes of enterprises.

2.1.1. Network Infrastructure

Network infrastructure refers to the collective term for both hardware and software that facilitate network communication, enabling connections and communication among users, devices, applications, and the Internet. This encompasses hardware facilities such as optical fiber networks, integrated cabling, wireless networks, and base stations, as well as software systems like network infrastructure management software. The construction of network infrastructure effectively drives the digital transformation [5] of enterprises and also holds a critical position in the financial domain. Specifically, network infrastructure enables the real-time transmission and processing of financial data, thereby significantly enhancing work efficiency. Simultaneously, it also offers a secure environment for the storage and transmission of financial data, safeguarding the confidentiality of financial information. Furthermore, the widespread adoption of network infrastructure has expedited data interconnection, substantially promoted the disclosure [6] of corporate information, thus reducing information asymmetry, ensuring timely access to market dynamics and financing information, and mitigating the risk of investment and financing term mismatch.

2.1.2. Information Service Infrastructure

Information service infrastructure is defined as the aggregation of hardware and software facilities that offer convenient and efficient services to information users. It encompasses multiple aspects such as network communication, data processing, storage, and transmission, serving as a crucial cornerstone for the development of modern society's informatization. Specifically, the information service infrastructure comprises communication base stations, optical cables, servers, data centers, and various types of application software, which jointly constitute a complete system that supports information transmission, processing, and service provision. In recent years, the rapid development of the financial shared service center has also furnished a more straightforward and precise calculation method for the processing of enterprises' financial business, achieving cost reduction and efficiency enhancement. It also exerts a positive influence on addressing the mismatch of investment and financing terms. Meanwhile, the information service infrastructure functions as the "intelligent brain" for enterprises' investment and financing decisions. Through cloud computing, enterprises can access and process substantial amounts of data at any time and any place, promptly exploring potential investment opportunities and evaluating investment risks. The big data center is capable of providing comprehensive and accurate data support for enterprises, thereby assisting them to formulate investment and financing strategies more precisely. For enterprises, the construction and improvement of the information service infrastructure represent one of the key steps in enhancing competitiveness and realizing digital transformation.

2.2. Term Mismatch of Investment and Financing

The misalignment in investment and financing predominantly encompasses maturity mismatch, which refers to the incongruity between the time span of financing undertakings and the duration for which funds are needed in investment projects. Maturity mismatch can be primarily categorized into two types: "short-term financing for long-term investment" and "long-term financing for short-term investment". Such maturity mismatch might give rise to a series of issues, including problems related to capital liquidity, an escalation in the costs of rolling financing, and fluctuations within the financial market.

2.2.1. Short Financing and Long Investment

The term "short - term financing and long - term investment" commonly denotes a mismatch in the duration between financing and investment activities, specifically when the financing period is substantially shorter than the investment time frame. This kind of imbalance can subject enterprises to liquidity and operational risks [7]. In actual practice, the phenomenon of using short - term financing for long - term investments is relatively prevalent in China, where banks constitute the principal source of financing for businesses. For banks, the administrative costs and risks related to long - term loans are usually higher. Moreover, fluctuations in monetary policy further decrease their inclination to provide long - term credit. From the enterprise's point of view, not all companies can obtain long - term loans with ease. The complexity and strict requirements of long - term financing frequently prompt firms to choose shorter - term loans because of their lower costs. This situation leads to "short - term financing for long - term investments," which in turn intensifies the pressure of short - term debt repayment. Consequently, enterprises need to possess stronger short - term profitability to maintain financial stability.

2.2.2. Long-term Financing and Short-term Investment

"Long - term financing and short - term investment" describes the act of employing funds acquired through long - term financing for short - term investment purposes. Long - term financing usually stems from sources such as long - term bonds, stock issuance, or long - term loans. These funds not only fulfill the requirements for long - term assets but also frequently flow into current assets, thereby decreasing the dependence on short - term liabilities. For enterprises, taking advantage of the relatively lower costs of long - term financing and simultaneously engaging in flexible, highly liquid short - term investments can assist in reducing short - term repayment risks. However, an increased dependence on long - term funding can also cause an increase in overall financing costs, which may potentially reduce profitability. Previously, Apple Inc. was an example of the long - term financing and short - term investment structure. The company's balance sheet showed significant equity investments and retained earnings on the liability side, while cash and cash equivalents were predominant on the asset side. This method - using stable, high - cost equity financing to support relatively low - yield cash equivalents - created a mismatch that increased Apple's financing costs and affected its profitability.

3. Policy Environment

Since the term "digital infrastructure" was initially proposed in 2018, its development has attracted substantial attention. During the past six years, a large number of policies have been formulated to stimulate businesses to construct digital infrastructure, improve production efficiency, optimize resource allocation, and propel China's digital economy forward.

In March 2021, the 14th Five - Year Plan for National Economic and Social Development and the Outline of Vision Goals to 2035 were published. These documents underlined the coordinated development of traditional and new infrastructure to construct a modern,

systematic, efficient, intelligent, green, safe, and reliable infrastructure system. At the October 2022 Wuzhen Summit of the World Internet Conference, the "Digital Infrastructure: Connectivity and Innovative Development" Forum was convened. This forum was co-sponsored by the Ministry of Industry and Information Technology, the Cyberspace Administration, and the International Telecommunication Union (ITU). In February 2023, the Central Committee of the Communist Party of China and the State Council released the "Overall Layout Plan for the Construction of Digital China". This plan emphasized the necessity of digital empowerment in economic and social development. It called for cultivating core industries within the digital economy, formulating measures for the high-quality development of the digital sector, and constructing digitally-competitive industrial clusters on an international scale. Moreover, the plan stressed promoting the integration of digital technologies with the real economy and accelerating their innovative application in key sectors including agriculture, industry, finance, education, healthcare, transportation, and energy[8].

4. Impact of Digital Infrastructure Construction on Maturity Mismatch of Investment and Financing

Maturity matching constitutes a crucial principle within enterprise investment and financing decision-making processes. Nevertheless, in recent years, a significant mismatch in the terms of investment and financing among Chinese enterprises has emerged, causing numerous companies to encounter financial difficulties. For example, Gene Nickel, a prominent player in the non-ferrous metals industry, depended on the continuous roll-over of short-term debt to finance long-term investments, an approach that ultimately pushed the company to the verge of being delisted. Industrial policies and green finance policies can exert a positive impact on enterprises' capabilities to more effectively match investment and financing terms[9]. Digital infrastructure provides further advantages by augmenting enterprise productivity[10], enabling efficient resource allocation, spurring innovation, and decreasing transaction costs. Significantly, it also enhances transparency, mitigates investment and financing risks, and optimizes resource distribution. By resolving the challenges associated with term mismatches in investment and financing, digital infrastructure empowers enterprises to make more accurate and well-informed decisions.

4.1. Impact of Network Infrastructure on Investment and Financing Term Mismatch

The swift development of new infrastructure spearheaded by 5G is emerging as a prominent impetus for high-quality economic growth, social progress, and digital transformation, thereby revolutionizing both production and lifestyle paradigms [11]. In the contemporary Internet-fueled economy, network infrastructure, such as broadband and high-speed connectivity, has witnessed remarkable advancements. Transitioning from traditional manual operations to network-coordinated ones, numerous industries now operate with high-speed connectivity, functioning akin to an "enterprise nervous system". In contrast to the earlier eras of restricted network development, present-day enterprises possess more diverse and expeditious channels for accessing information, with a substantially enhanced quality of information. The "Broadband China" strategy, initiated in 2013, has played a crucial part in spurring investment and fostering information consumption, while also contributing to the mitigation of the prevalence of mismatches between short-term financing and long-term investments within enterprises[12]. This impact is manifest within enterprises, as enhanced access to relevant information empowers them to respond more promptly. In the realm of financing, information asymmetry can give rise to adverse selection or moral hazard, thereby escalating financing costs. This poses a particular challenge for small and medium-sized enterprises (SMEs), given that their limited information disclosure might lead to banks' reluctance to extend loans,

thereby exacerbating the propensity for short-term loans to be used for long-term investments. In investment decision-making, information asymmetry can result in suboptimal choices, intensifying the mismatches in investment and financing terms. The expansion of broadband and high-speed networks enables enterprises to remain abreast of market trends and financing opportunities. By leveraging platforms such as Stock Connect, Fortune Network, and internal information resources, enterprises can significantly curtail information asymmetry, relieve financing constraints, restrain managers' self-serving investment behaviors [13], and diminish the risks associated with mismatches in investment and financing terms, thus assuming a proactive preventative role.

4.2. Impact of Information Service Infrastructure on Investment and Financing Term Mismatch

Information service infrastructure, encompassing cloud computing and big data, functions as the "intelligent nucleus" within the realm of investment and financing decision-making. Cloud computing empowers enterprises to swiftly retrieve pertinent data relevant to investment and financing, thereby facilitating the identification of lucrative opportunities and the evaluation of associated risks. Big data, on the other hand, augments decision-making processes by affording enterprises access to extensive and highly precise datasets. These datasets underpin the formulation of well-informed strategies and serve to mitigate the probability of encountering mismatches in investment and financing terms. Presently, the rapid progression of artificial intelligence (AI), particularly with regard to large language models, has instigated substantial technological innovation. In the financial domain, AI-driven platforms such as financial shared service centers are revolutionizing operational modalities. This transformation enables finance personnel to transition from engaging in routine, mundane tasks to partaking in more strategic and high-value activities. This academic paper centers its attention on the influence exerted by two pivotal information service infrastructures – the prevalently adopted financial shared service platform and the nascent decision support systems for investment and financing – with the objective of minimizing the risks associated with term mismatches in investment and financing decisions.

4.2.1. Financial Sharing Service Center

Artificial intelligence and its associated technologies are extensively employed in corporate financial management as well as other domains, injecting fresh impetus into business development[14]. Since the introduction of financial shared services in China in 2005, the financial shared service center has evolved over nearly two decades to become a crucial element within modern enterprise financial management frameworks. As traditional financial models have manifested certain limitations, including redundant tasks and elevated labor costs, an increasing number of enterprises have embraced digital transformation via financial shared service centers. This transformation has notably enhanced the accuracy of accounting information, a result that remains valid even after undergoing robustness testing[15]. The centralization of financial data processing augments transparency, mitigates information asymmetry, and assists firms in formulating more precise investment and financing strategies, thereby exerting a positive influence on the alignment of investment and financing terms. Moreover, financial shared service centers, which integrate big data, artificial intelligence, and the Internet, are designed to achieve standardization and specialization. During the process of data processing, they evaluate corporate risks and issue timely warnings, enabling companies to detect and address potential issues. This approach not only enhances the credibility of financial institutions but also aids companies in avoiding ill-advised investment and financing decisions, thereby reducing the risk of mismatched investment and financing terms.

4.2.2. Investment and Financing Decision Support System

The investment and financing decision-making system represents an intelligent tool that hinges on data processing and modeling techniques. In recent years, with the rapid progress witnessed in the fields of artificial intelligence and big data, these systems have achieved substantial advancements in complex modeling, data mining, and knowledge reasoning, thereby augmenting their analytical and evaluative capabilities. For example, the decision support system implemented within the Piedmont region has played a facilitating role in new public sector financing and has been instrumental in bolstering the region's evaluation culture by means of enhanced data acquisition, compilation, and organization[16]. In recent years, PricewaterhouseCoopers' (PWC) DSAI Investment Management Digital Platform has not only incorporated its extensive industry knowledge and experience but has also embedded technological intelligence throughout every stage of project management. This platform provides support for the entire project lifecycle, both prior to and subsequent to investment, offering comprehensive professional services. Its core features encompass full-cycle management for activities such as fundraising, investment, operation, and exit strategies, and it encompasses a broad range of information, including financing progress, investor portals, financing structures, and the implementation of strategic targets. Undoubtedly, the combination of PWC's big data platform along with its profound knowledge and experience furnishes valuable digital investment solutions for companies availing of its services. This platform significantly diminishes the risk of investment and financing term mismatches and underpins more accurate decision-making. Furthermore, the investment and financing decision-making system employs computer algorithms to conduct a comprehensive assessment of the risks associated with enterprise projects. This, in turn, enhances decision-making accuracy, boosts capital efficiency, and further mitigates the risks related to mismatched investment and financing periods.

5. Implementing the Challenges of Digital Infrastructure Construction

In the context of the new digital infrastructure, digital security risks are escalating at a rapid pace, social security risks are recurring with a certain frequency, and political security risks are on an upward trend. The scopes of these risks are expanding[17], and their impacts are spilling over and permeating into diverse areas. As technological progress continuously brings about updates and iterations, the traditional financial model is being progressively supplanted by financial software driven by artificial intelligence, big data, and large-scale AI models. Although these advancements contribute to more precise and extensive data control, enhanced information transparency, and improved efficiency in financial work, they also usher in new challenges. One such challenge is the adverse consequences arising from the mismatching of investment and financing terms. With the evolution of technology, the issue of integrating new and old systems seamlessly can pose difficulties for numerous enterprises. This situation may potentially exacerbate the occurrence of mismatches in investment and financing terms. Moreover, data security and privacy protection assume a critical importance within this context. Given the digitization and increased transparency of all information, it is of utmost importance to ensure the secure transmission and storage of data and safeguard customer privacy during business operations. These challenges emphasize the necessity for enterprises to conduct a comprehensive assessment of the risks involved when constructing digital infrastructure. They also need to formulate appropriate strategies to mitigate potential impacts on investment and financing stability and prevent the aggravation of the problem of mismatched investment and financing periods.

6. Conclusion

This academic paper undertakes an examination of the impact that the development of digital infrastructure exerts on the capital mismatch of investment and financing periods within enterprises, within the context of the contemporary economic digital network. Through an analysis of relevant theories and a comprehensive review of the extant literature, two principal categories of digital infrastructure are identified – namely, network infrastructure and information service infrastructure – both of which can exert a positive influence on the mitigation of the mismatch of investment and financing terms. Specifically, network infrastructure, exemplified by 5G and broadband, expedites the access to market information and financing data, thereby diminishing information asymmetry and, as a consequence, reducing the risk of investment and financing term mismatches. Conversely, information service infrastructure, which encompasses cloud computing and big data, empowers enterprises to process substantial amounts of relevant data with greater accuracy and efficiency. This enables them to make more informed investment and financing decisions and curtails the probability of errors. Additionally, general cloud computing platforms are capable of conducting comprehensive investment risk assessments, while decision support systems can manage a broader spectrum of information, thereby further alleviating the risk of investment and financing term mismatches. Nevertheless, when establishing digital infrastructure, it is of pivotal importance to evaluate potential risks and formulate strategies to preclude them from disrupting the stability of investment and financing processes.

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