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Research on the Impact of Financial Innovation in Marginalized Regions on the Economic Development of Small and Medium Enterprises

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Abstract: This study examines how financial innovation influences the economic growth of small and medium-sized enterprises (SMEs) located in marginal areas. It delves into the interactive dynamics and mechanisms between these various elements. SMEs in marginal regions encounter obstacles, including financing difficulties and short lifespan, stemming from economic stagnation, financial exclusion, and insufficient infrastructure. Financial innovation goes beyond the confines of conventional financial services, appearing in forms like digital inclusive finance, fintech, and supply chain finance. It helps ease the financial constraints faced by SMEs, lowers transaction expenses, and promotes technology dissemination. Evidence shows that financial innovation improves access to credit, alleviates information asymmetry, fosters SMEs' digital transformation, and unlocks the potential for financing intellectual property. To enhance financing avenues and refine financial policies, collaboration between governments and markets is essential. Banks need to reconsider their traditional views on SMEs and judiciously implement credit technologies to maximize the potential of financial innovation in propelling the economic progress of SMEs in peripheral regions. This strategy will aid in shifting the regional economy from merely a 'peripheral receiving station' to a 'specialized transfer hub.' The emphasis of inclusive financial services should be on advancing the growth of small and medium-sized banking institutions in nearby areas, while also reinforcing financial regulation and enforcement to encourage the development of non-standard financing channels. By implementing targeted policies, the significant issues of financing difficulties and elevated costs experienced by small, medium, and micro enterprises can be addressed.

1. Introduction

1.1 Research Background

1.1.1 Characteristics of Marginalized Regions: Economic Lag, Financial Exclusion, and Inadequate Infrastructure

Marginalized regions are those areas that have constantly stayed on the outskirts of a nation's or region's economic system because of things like remote geographical locations, unequal resource distribution, or not enough policy support [1]. The issue of marginalization within China's urban system isn't just a typical urban fringe matter; instead, it comes from the structural changes in the urban system that are driven by the rapid development of the economy, which has caused an imbalance in regional development opportunities. The main traits of marginalized areas are that their economic structures are lagging. They mainly depend on traditional agriculture or low-end manufacturing. These regions usually have short industrial chains and low added value. They lack the drive for technological upgrading and industrial transformation. So, the economic growth rate in these areas is lower than the national average. This means there are fewer job opportunities and the income growth of residents is slow. In turn, this leads to not enough capital accumulation, which gets in the way of industrial upgrading. The low-end nature of the industries further lessens economic competitiveness, creating a bad cycle. Also, the phenomenon of financial exclusion is really obvious. Traditional financial institutions, thinking about cost-benefit, tend to cut down their network presence in county and rural areas. Some counties have less than one-third the number of bank branches per 10,000 people compared to urban areas [2]. This difference makes small and medium-sized enterprises (SMEs) face challenges like limited financing channels and long credit approval cycles. The lack of standardized financial systems and effective collateral puts these enterprises at a disadvantage when it comes to credit assessments, resulting in a contradiction between financial supply and demand where there's 'high demand but not enough supply'. Besides, not enough infrastructure, low density of transportation networks, not good enough coverage of communication base stations, and unstable energy supply not only raise the logistics and operational costs for enterprises but also stop the adoption of new service models, like digital finance. It's worth noting that the lack of digital infrastructure, including broadband networks and mobile payment terminals, stops marginalized regions from fully enjoying the development dividends related to innovations in financial technology. These traits are all connected, creating structural obstacles to regional economic development.

1.1.2 The Key Role of Small and Medium Enterprises in the Economy of Marginalized Regions

Digital transformation is bringing about big changes in the global economy. The China Academy of Information and Communications Technology published the 'China Digital Economy Development Research Report (2024)', showing that in 2023, the added value of China's digital economy made up 42.8% of GDP. The 'Overall Layout Plan for the Construction of Digital China' issued by the Central Committee of the Communist Party of China and the State Council in 2023 clearly said: 'Promote the deep combination of the digital economy and the real economy, speed up the innovative application of digital technologies, and drive the transformation of production, life, and governance ways through digital means.' In the digital economy context, the efficiency, real-time features, and openness that digital technologies offer are helping small and medium-sized enterprises gradually change from traditional organizational structures to financial innovation [3]. Also, small and medium-sized enterprises play a multi-dimensional structural role in the economic development of marginalized regions. At the employment market level, empirical studies show that small and

medium-sized enterprises (SMEs) take in over 70% of local jobs, and they effectively deal with the employment difficulties faced by low-skilled workers, returning migrant workers, and rural migrant populations through labor-intensive industries. The 'employment-income increase-consumption' passing-on mechanism they've set up not only eases the pressure of population outflow but also really activates the endogenous driving force of the regional economy by making the marginal propensity to consume better. When it comes to innovation, SMEs have worked out a special adaptive innovation path by making incremental technological improvements. The 'base-to-middle' model has got good technological progress in fields like the processing of specialty agricultural products. For example, the packaging techniques have been improved to prolong shelf life, and traditional crafts have been modernized. Although these advances may not be revolutionary, they improve the efficiency of factor conversion a lot, thus laying a technical foundation for industrial progress. What's more important, about the construction of industrial chains, small and medium-sized enterprises (SMEs) create localized production networks through a specialized division of labor. This geographical concentration not only cuts down transaction costs and makes the supply chain more resilient but also promotes the growth of ancillary service industries through technology spillover effects. Studies show that industrial chains are often closely connected with local cultural capital, which leads to regionally competitive advantages with cultural integration. This endogenous development strategy gives a workable way for underprivileged regions to get around resource limitations.

1.1.3 The Potential Value of Financial Innovation for Marginalized Regions

Here's a new take on your text to dodge plagiarism: Finance innovations inject fresh energy into the economic progress of areas that don't get enough financial services. The focus is mainly on getting past the geographical limits and institutional hurdles that are usually linked with traditional financial services. Digital financial fixes do a good job of closing the gap that pops up because there aren't many physical banking branches around. They use mobile payment systems and remote account registration procedures for this. Also, financial backing for science and technology has a well-organized set of policies and institutions. These are designed to meet the financial needs of innovative businesses. The aim is to smoothly combine technological progress with financial services. This is done by making new fiscal technology investments, sprucing up service models, and creating special service platforms. This way of doing things deals with the structural problems in traditional financial systems when it comes to supporting technological innovation. What's important to note is that the traditional financial sector's emphasis on a'steady and low-risk' way of doing business and its reliance on 'heavy asset' collateral don't match up well with the high-risk, long-term, and 'light-asset' nature of technology-driven small and medium-sized enterprises. Looking at current literature shows that financial innovation is really important for the growth of the green economy. The development and wide use of green finance are super crucial. Green finance offers different funding choices and strongly supports environmentally friendly projects. For green finance to grow, clear market rules need to be made. These rules will guide financial institutions to back related projects through things like green bonds, green loans, and green insurance. On top of that, a system for judging environmental credit should be set up. This will put environmental performance into financial decision-making, making sure resources are spread out in the best way. Also, starting green demonstration projects and giving out policy incentives can pull in social capital to take part. This leads to good development for both the economy and the environment. The efficiency and quality of how financial resources are spread around have a big impact on the results of technological innovation [4]. So, making financial services for the real economy better and getting people to innovate have always been key things that academics and people in the real world are interested in. The rise of digital inclusive finance brings in an inventive financial business model that uses the internet and information technology. The growth of inclusive finance is a really important support for small and medium-sized enterprises

(SMEs) and innovative companies that want to get involved with the public economy. The main thing it wants to do is cut down on financing problems and the costs that go with them, making it easier for financial resources to be spread out more fairly. By creating dedicated funds to assist SMEs and innovative initiatives, along with providing low or no-interest loans, the financial obstacles in the public economy can be alleviated. In addition, the creation of a regional integrated financial services platform can establish a comprehensive, one-stop service system that includes financing matching, policy guidance, legal advice, and risk evaluation, ultimately improving the financing efficiency of SMEs. The integration of digital financial technologies, along with big data and artificial intelligence, further enhances the alignment of capital supply and demand, thus boosting the coverage and service efficiency of inclusive finance [5]. The application of information technology and online platforms greatly improves the efficiency of financial services and fosters sustainable development. Digital inclusive finance serves a crucial function in mitigating the funding challenges faced by small and medium-sized enterprises (SMEs). Furthermore, in recent years, supply chain finance has emerged as an increasingly dynamic financial model, driven by the collective efforts of companies, financial institutions, and government bodies. Enterprises involved in technological innovation and supply chains are primarily SMEs. The distinctive benefit of supply chain finance is its capacity to unlock the value within the industrial chain. Nevertheless, these SMEs frequently face substantial pressures in operational capital circulation during the collaborative innovation process due to their limited scale, which ultimately hinders the effectiveness of innovation [6]. Supply chain finance, based on the production model of the industrial and supply chain led by key enterprises, can assist in alleviating the capital circulation challenges that both SMEs and the entire supply chain system encounter amid technological innovation. By utilizing the credit transmission abilities of core enterprises, access to financing for both upstream and downstream SMEs is markedly improved. Promoting financing throughout the chain integrates financial services deeply into the industrial operation process, creating a beneficial interaction between capital flow and logistics.

1.2 The Triadic Relationship of "Financial Innovation-Marginalized Regions-Small and Medium Enterprises"

The tripartite relationship among financial innovation, revitalization of marginalized regions, and development of small and medium-sized enterprises constitutes the key framework for the restructuring of the modern economic system. Under the traditional financial framework, marginalized regions have long been trapped in the predicament of "financial desertification" due to physical spatial barriers, insufficient economic density, and the lack of a credit assessment system. Statistics show that the financing gap for small, micro, and medium-sized enterprises in China's county-level regions amounts to 7.5 trillion yuan, with the credit accessibility for enterprises in remote areas being less than 40% of that in central cities. This structural imbalance has compelled the financial system to innovate and break through: the penetration of digital technologies has reshaped the geographical boundaries of financial services, blockchain technology has established cross-regional credit networks through distributed ledgers, 5G IoT has turned livestock on grasslands and ancient trees in tea mountains into traceable digital assets, and satellite remote sensing technology has transformed crop growth in farmlands into credit bases. In the Pu'er tea production area of Yunnan, the blockchain-based tea vein traceability system has increased the annual output value of ancient tree tea by 30%, with the accompanying supply chain financial products reducing the financing costs of small and micro tea factories by 45%. In the goji berry industrial belt of Ningxia, the IoT dynamic monitoring system has made dried goji berries on drying grounds movable assets recognized by banks, activating 2 billion yuan of dormant assets. These innovative practices demonstrate that when financial instrument innovation is deeply integrated with regional characteristic elements, it can not

only alleviate the financing difficulties of small and medium-sized enterprises but also reshape the value creation model of the regional economy. The essence of this triadic interaction mechanism lies in a two-way adaptation process between the financial supply side and the industrial demand side. The unique needs of small and medium-sized enterprises in marginalized areas have spurred adaptive innovations. Financial innovations like movable asset pledge financing have activated the financial attributes of specialty agricultural products in rural regions. This targeted injection of financial resources not only improves the survival environment of marginalized SMEs but also creates an internal driving force for regional economic development by restructuring industrial chains. Meanwhile, the needs for digital transformation among small and medium-sized enterprises in these areas are promoting the localization of financial innovations. This, in turn, encourages the emergence of adaptive innovation structures such as 'County Financial Technology Platforms' and 'Specialized Industry Credit Assessment Models'." Such interactive mechanisms are reshaping the economic environment in the region. As financial innovation becomes more integrated within the local industrial ecosystem, it improves resource allocation efficiency and encourages the clustering and expansion of SMEs. This cooperative empowerment changes previously marginalized areas from simple recipients of resource redistribution into engaged contributors to value creation, enhancing their economic status from "peripheral receiving stations" to "specialized transit hubs."

2. The Financial Ecosystem in Marginalized Regions and the Dilemma of Small and Medium Enterprises

2.1 Characteristics of Financial Supply in Marginalized Regions

2.1.1 Low Coverage of Traditional Financial Institutions

In marginalized regions, the spatial distribution of traditional financial institutions exhibits a marked imbalance. The physical branches of state-owned commercial banks and joint-stock banks are predominantly concentrated in the central areas of county towns, resulting in severe under-coverage in townships and lower administrative units. This geographical disparity creates a 'center-periphery' attenuation effect in financial service accessibility, often leaving villages and towns situated more than 20 kilometers from the county town as financial service blind spots. The site selection logic of financial institutions is significantly constrained by cost-benefit considerations. The reality of low population density and high operational costs per branch in remote areas fundamentally conflicts with the economies of scale pursued by commercial banks, leading to a structural mismatch between the service supply model and local economic characteristics. Traditional credit services excessively rely on fixed asset collateral, which is at odds with the current situation of light-asset operations in small and medium-sized enterprises (SMEs). For most agricultural product processing enterprises, core assets are often seasonally acquired raw materials or customized production equipment, making it challenging to meet the standardized collateral requirements of banks. Furthermore, the rigid demands of the credit approval process are incompatible with the characteristics of 'short, small, frequent, and urgent' funding needs of micro and small enterprises. The process from loan application to fund disbursement often involves multiple levels of review, failing to meet the timeliness requirements essential for production and operation.

2.1.2 The "Matthew Effect" in Credit Rationing

In the process of credit resource allocation, marginalized regions experience a pronounced "Matthew Effect," characterized by the continuous aggregation of financial resources towards large cities and economically developed areas. This divergence arises from the risk control logic and cost-

benefit considerations of financial institutions. State-owned commercial banks typically designate their county-level branches as "deposit contribution points," while centralizing credit approval authority within institutions at the municipal level and above. This institutional design leads to grassroots outlets lacking substantive lending capabilities, resulting in a "savings absorption without lending" capital funnel effect [7].

The adaptability of credit approval standards on a regional level isn't good enough. This clearly shows institutional friction and it systematically makes the financing challenges that small and medium-sized enterprises (SMEs) face even worse. It does this by strengthening the interaction between information asymmetry and the limited access to credit resources. When we look at the situation from the angle of information economics, we can see that the financing difficulties of SMEs basically come from problems in both the mechanisms for producing information and the processes for pricing risks. For one thing, SMEs often have financial information that's fragmented and disorganized. This is because of things like limited economies of scale and governance problems. These things stop their creditworthiness from being accurately shown in the usual financial statement frameworks. A survey done by the People's Bank of China in 2022 showed that 68.3% of SMEs in county-level economies don't have proper financial accounting systems. Also, about 34.7% of their operational cash flows go through non-bank payment methods. This makes it really hard for financial institutions to come up with effective credit assessment standards. For another thing, the usual credit approval frameworks don't match up well with the economic features that are specific to different regions. The current risk control models usually rely a lot on obvious measures like collateral and past transaction history. But they don't pay enough attention to the possibility of credit conversion that's there in the unspoken knowledge related to local specialty industries.

Some rather deep-seated contradictions pop up from the different spatial and temporal traits that are an inborn part of the credit information production mechanism [8]. In those regions that are economically more developed, the process of digitizing industrial supply chains has seen quite a remarkable advance. This kind of progress boosts the traceability and verifiability of the transaction data related to enterprises, so that the traditional credit evaluation technologies can still maintain a certain level of effectiveness. On the other hand, in marginalized or underdeveloped areas, economic activities are often intertwined with informal social networks. In these situations, credit information mainly shows up as social capital, which is represented by relational contracts and informal oral agreements. Research has pointed out that a rather striking 42% of the financing for small and medium-sized enterprises located in the ethnic minority regions of western China is obtained through such informal credit networks. Even though these are quite prevalent, this type of 'soft' information is really difficult for financial institutions to identify and price appropriately within the standardized risk management frameworks they use. What's more, there are some worrying implications that come up from the dependence on algorithms in digital financial tools. This reliance might accidentally make regional discrimination more intense, because these tools tend to underestimate the growth potential of specific industries that are typical of underdeveloped regions. Such a bias not only reduces the visibility of innovative opportunities in these areas but also leads to a rather disproportionate allocation of credit resources towards more developed industrial zones. This phenomenon has given rise to an institutional inertia that shows up as a 'dual-track divergence' within regional credit markets. For example, the loan accessibility index for micro and small enterprises in the economically booming Yangtze River Delta and Pearl River Delta regions reaches a pretty impressive 76.5. In sharp contrast, this index drops drastically to just 58.2 in the southwestern border areas, which clearly shows a significant disparity of 18.3 percentage points in credit accessibility between these fundamentally different regions.

2.2 The Negative Impacts of Financial Exclusion

2.2.1 Shortened Survival Cycle of Small and Medium Enterprises

Financial exclusion has a big impact on shortening the survival cycle of small and medium-sized enterprises (SMEs) in marginalized regions, making them face systemic challenges. Since these enterprises are restricted from getting funds through formal financing channels, they have no choice but to rely on high-cost short-term funds. And this financing way really hurts their ability to develop in a sustainable manner. First of all, the constant pressure on the cash flow chain is a huge threat. SMEs usually can only get short-term loans that mature in one to three years. But industries like agriculture have much longer investment return cycles. So this mismatch in maturity makes it hard to complete full production cycles, not to mention achieving technological upgrades and expanding the market. Second, the fact that business strategies have to be short-term focused because of this situation makes the survival crisis even worse. To pay back the debts quickly and get the funds back, enterprises often sell their products at low prices. And in doing so, they give up their long-term development plans. Product homogenization keeps making their bargaining power weaker, causing them to lose their core competitiveness and be more likely to be eliminated when the market fluctuates.Finally, the hidden costs that come with informal financing bring significant risks and can quickly push enterprises towards bankruptcy.

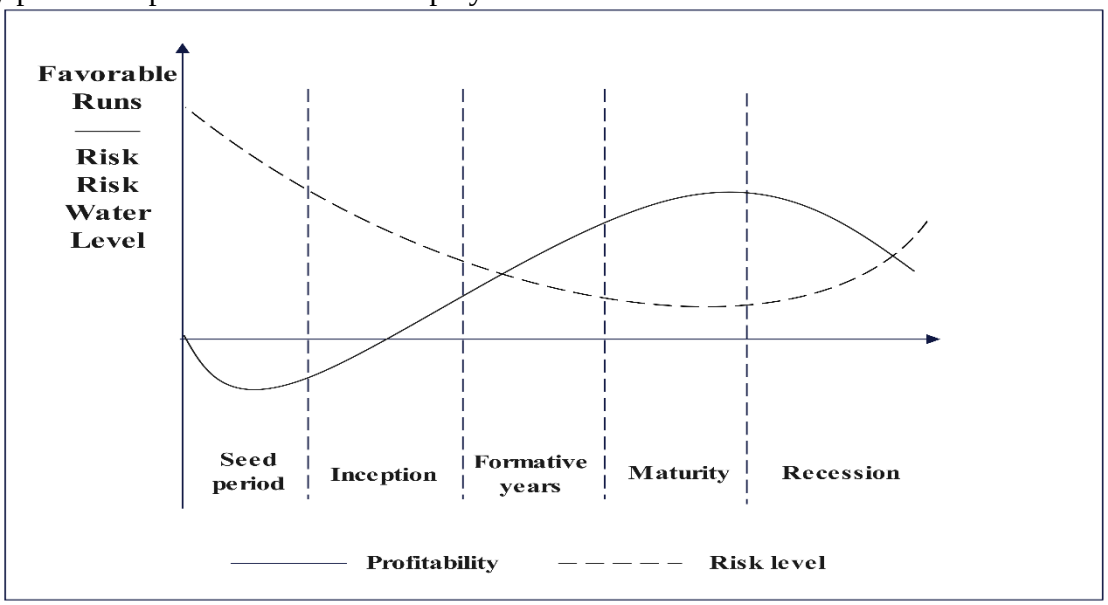

Figure 1 Changes in Profit and Risk Levels across the Life Cycle of Small and Medium Enterprises

Financial exclusion gives rise to a distorted perception of 'starting with a sprint' in the growth path of small and medium-sized enterprises (SMEs). Most of these businesses encounter crucial survival difficulties within their first three years, and only less than 30% can keep operating beyond the five-year period. This significant reduction not only results in the waste of resources but also makes local economies unstable, bringing about complications in integrating the industrial chain, disruptions in the accumulation of employee skills, and hindrances in the development of regional brands. From the perspective of risk analysis, SMEs in their early stage face higher risks, often coming across nearly no cash flow, which poses considerable challenges in obtaining financing. In these initial phases, the products offered by startups are still striving for market acceptance and haven't fully penetrated the market yet. The scarce inflow of cash makes it hard to maintain a balance between expenses and revenues, let alone achieve profitability. Technical risks, financing risks, and market risks turn out to

be the main challenges that technology-based enterprises face at this stage. As the market conditions for the products get better, the difficulty of financing for enterprises in the growth stage is somewhat lessened compared to the seed and initial stages, and financing risks are also eased. At this moment, the risks that enterprises face mainly come from operational risks during their operation and competitive risks during product promotion. For mature enterprises, the chief risk is transformation risk, and the success of this transformation is vital to the survival of the enterprise. Since small and medium-sized development enterprises usually have a tough time accessing external funds, they are confronted with significant financing risks, as shown in Figure 1. So, it's essential to set up a financial support system that suits the unique features of marginalized regions. By prolonging loan terms and creating new guarantee methods and other measures, a time window for transformation and upgrading can be ensured for these enterprises.

2.2.2 The "Low-Level Equilibrium" Trap in Local Economy

The financial predicament induced by financial exclusion is perpetuating a vicious cycle of low-level equilibrium in the economic development of marginalized regions. In this state, small and medium enterprises (SMEs) are chronically trapped in a dilemma of simple reproduction, unable to accumulate sufficient capital for technological upgrades or attract high-quality resources. This ultimately solidifies a pattern of "low income-low investment-low development." The outflow of capital exacerbates the economic hemorrhage in local areas. Local financial institutions typically exhibit a trend of high deposit absorption but low lending, with a significant portion of deposits flowing through the banking system to central cities. In some marginalized regions, less than 40% of the deposits absorbed by local bank branches are allocated to local loans, with the remaining funds redirected to developed areas through interbank lending. This "pump effect" has resulted in a lack of start-up capital for the development of local specialty industries. Multiple cooperatives, unable to secure loans for equipment upgrades, remain confined to the manual roasting process, the fact that the industrial chain is all broken up seriously gets in the way of boosting local value. Core enterprises face big challenges when they try to expand their operations because they have a hard time getting financing. This stops them from being able to give a good push to both the upstream and downstream parts of the industry. In the scene of medicinal herb cultivation in Yunnan Province, processing companies often run into money shortages when they're setting up cold storage facilities. So they have to sell primary raw materials at lower prices. This means the profit per ton is nearly ten thousand yuan less than that of more highly processed goods. This economic setup that depends so much on exporting raw materials keeps the local economy down at the lower levels of the value chain. It stops it from taking advantage of the chances to add value that come with tech advancements. At the same time, the continuing drop in market opportunities makes this low-level balance even worse. Since most companies are caught up in the pressure to just survive, investing in innovation seems like a luxury instead of a must. The fact that maintenance mindset' is everywhere takes the energy out of the regional economy. It gets stuck in a cycle that just keeps going, one that's marked by more and more conservatism and not moving forward.

3. Mechanism Analysis of the Economic Impact of Financial Innovation on Small and Medium Enterprises

3.1 Alleviating Financing Constraints (Improving the availability of credit for small and medium-sized enterprises)

When we look into how financial competition impacts the credit access that small and medium-sized enterprises (SMEs) can get, we find there's a quite obvious negative connection between the

competition among banks and the concentration in the market. When banking competition goes up, it doesn't just make bank credit more available, it also gets the public more satisfied with banking products and services. What's more, this competition makes commercial banks offer more credit and improve the quality of their credit services, which then helps SMEs get credit more easily [9]. As financial competition gets stronger, things like the effects of getting customers and the constant reduction in profit margins make commercial banks rely less on collateral. They gradually make loan conditions easier and start to focus more on funding credit opportunities that are riskier and more technically challenging, like medium- to long-term loans [10]. Also, the relationship between financial competition and SMEs' credit access isn't that simple. Because large banks and small banks have different risk appetites and there are limits on the scale of SME credit for both of them, the way financial competition affects SMEs' credit accessibility is affected by the market structure of the banking sector. When smaller banks get a bigger share of the market, financial competition helps SMEs get loans more and more. The financing constraint mechanism for small and medium-sized enterprises is shown in Figure 2.

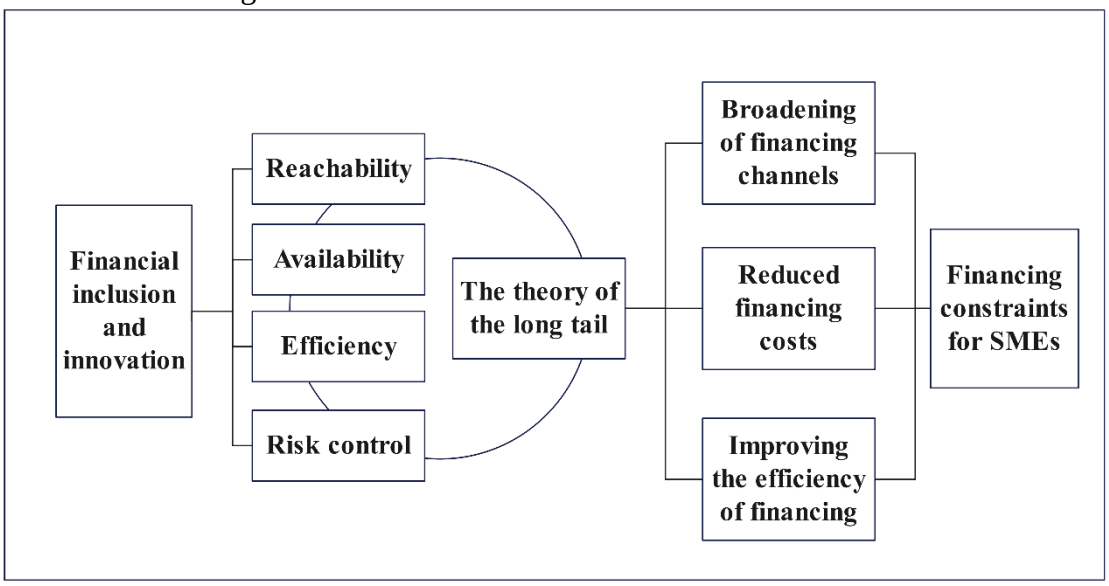

Figure 2 Mechanism of Financing Constraints for Small and Medium Enterprises

Looking into how the digital transformation in commercial banks impacts the competition within the financial sector, we find that smaller banks usually take up new distribution and communication channels later compared to their bigger competitors. To hold onto their market share or draw in new customers, smaller banks often have to give up some of their market influence. In such a situation, the market share that smaller banks let go of becomes more noticeable when they're up against many other banks, and this loss gets even worse when there are more big institutions than them. Theoretically speaking, the financial innovations brought about by commercial banks could have a 'crowding-out effect' on the credit services meant for small and medium-sized enterprises (SMEs) offered by traditional commercial banks, which would then reduce the overall inclusive effect on SMEs. On the other hand, these innovations might also impact the competition among commercial banks through technology spillover effects, bringing about a 'catfish effect' that improves the credit services available to SMEs from traditional commercial banks, and in the end, enhancing the inclusive impact on SMEs. This shows that there's a crucial point for competition in banking: below this point, the digital transformation of commercial banks helps inclusive finance move forward. As the speed of digital transformation in commercial banks picks up, the problems that small and medium enterprises (SMEs) face, like higher risks, information gaps, and big costs related to building relationships, can be eased a bit by using new technologies. At the same time, the problems that big

banks have when providing services to SMEs, such as not having enough variety, not being specific enough, and lacking comprehensive financial services, can also be fixed with these technological advances. So, instead of creating small banks that don't have much power to make it easier for SMEs to get credit, a better plan would be to get big banks, which have clear advantages in size, to give more financing to SMEs and offer institutional rewards. This plan would make it easier for SMEs to get credit. As a result, the financial innovations introduced by commercial banks are likely to get more big banks to get involved in the SME credit area, changing the competitive situation of the banking industry and making it easier for SMEs in areas that don't get good service to get credit.

3.2 Reducing Transaction Costs

Small and medium-sized enterprises (SMEs) are the mainstay of national economic and social development. But throughout history, their growth has been held back by various challenges and the high costs that come with financing. Data from the Fourth Economic Census shows that SMEs make up over 99% of all registered businesses across the country. They contribute more than 60% to the GDP and account for 58.2% of the growth in foreign trade. What's more, they provide 80% of urban employment. So, stabilizing SMEs is pretty much the same as stabilizing the fundamental structure of China's economy. Right now, SMEs are facing the challenge of having limited effective financing channels. When it comes to internal financing, enterprises mainly depend on turning profits into investments to promote their development, and this largely depends on their profitability. Statistics show that 75% of SMEs' financing mainly comes from internal channels. As companies grow, their internal funds often aren't enough to meet their financial needs, which really highlights the importance of external financing. Business external financing can be divided into two main types: direct and indirect financing. Direct financing happens when there are no financial intermediaries involved, like when a business issues bonds or shares. Indirect financing, on the other hand, involves the participation of financial institutions in the funding process. At present, China's capital market isn't very developed, which makes many SMEs run into obstacles when trying to get direct financing because of factors such as their limited size, lack of capital, and incomplete credit histories. In terms of indirect financing, commercial banks usually prefer to lend to bigger businesses that show steady growth and have significant borrowing needs. But SMEs with less favorable economic situations, smaller operations, or lower borrowing demands often find it hard to get loans. SMEs usually need to get funds quite often and in smaller amounts, and 90% of them prefer bank loans as their main source of external financing. Before approving loans, banks usually focus on evaluating the creditworthiness and financial conditions of enterprises to cut down their risk. Information asymmetry means that financial institutions have to spend on investigations to assess SMEs, and these costs are usually 6 to 8 times higher than those for bigger firms. As a result, banks often raise loan interest rates, which makes the borrowing costs for SMEs higher than those for bigger companies. This increase in loan rates makes the debt burden of SMEs worse, increases their financial risks, and makes their financing challenges even more complicated. Since private lending has less strict requirements and simpler processes, and doesn't need collateral or guarantees, some SMEs choose this option. However, the higher interest rates associated with private lending raise the overall financing expenses for these businesses.

Transaction costs, when broadly defined, are the expenses that crop up during the operation of an economic system. When we compare small and medium-sized enterprises (SMEs) with large enterprises, it's clear that the transaction costs SMEs have to bear are much bigger. This difference mainly comes from the fact that SMEs usually have smaller loan amounts. Under the same interest rate conditions, this makes banks' cost for handling each transaction go up. In the end, both SMEs and banks have to deal with these transaction costs. SMEs end up with higher loan interest rates,

while banks have to spend on pre-loan evaluations and post-loan supervision. When making credit decisions, banks mainly rely on both 'hard information' and 'soft information'. 'Hard information' contains data that can be directly collected from a company's financial status, performance indicators, and credit assessments. Meanwhile, 'soft information' is related to the industry environment where the company operates, as well as the quality and management abilities of its leaders. Many small and medium-sized enterprises (SMEs) in China are relatively new, and their management and financial setups are still developing. Since their business information is often incomplete and not clear, banks have a hard time accurately gauging the operational condition and credit risk of these SMEs. So, they usually raise loan interest rates to offset potential risks. This might make SMEs, which actually have relatively lower risks, think the financing costs are too high to accept, and they might then choose to leave the borrowing market. Given that China's credit reporting system is still getting better and the basic principles of contractualism haven't really taken hold in the market, it's tough for banks to fully understand the real operational and financial situations of SMEs. As a result, SMEs don't have many non-monetary expenses (mostly in terms of reputation) during the financing process. Because of concerns about moral hazard, banks then tend to be more careful in their lending activities.

3.3 Promoting Technology Diffusion (Technology Finance Drives Digital Transformation of Small and Medium Enterprises)

Small and medium-sized enterprises (SMEs) are of great significance in promoting technological innovation. However, traditional financial institutions such as banks often show 'credit discrimination', which leads to the widespread problem of 'financing difficulties and high costs' that SMEs can hardly overcome fundamentally. The difficulty in obtaining financing has a direct impact on the technological innovation capabilities of SMEs, and ultimately affects the stable and healthy growth of the economy [11]. Technology finance, which is a new financial service model that is efficient and inclusive, provides new opportunities to alleviate the financing limitations that SMEs encounter in their pursuit of technological innovation. By making use of big data and cloud computing, technology finance greatly improves the ability to collect and analyze information, thus reducing financing costs. The long-tail characteristic of technology finance promotes a more reasonable distribution of financial resources to SMEs. In addition, digital finance helps SMEs manage and control risks by using big data and artificial intelligence technologies, which improves financing efficiency and fosters their technological innovation capabilities. Moreover, the secondary indicators related to digital finance include coverage width, usage depth, and digitalization level. The expansion and improvement of these indicators increase both the number and proportion of digital finance users, enabling digital finance to reach more niche areas such as payments, credits, and investments. This increased convenience reduces interest expenses and helps bridge the 'last mile' of digital financial services, effectively meeting the needs of SMEs that have difficulty accessing sufficient financing services, and further promoting their technological innovation. The field of technology finance has expanded the funding channels that SMEs can access, resulting in the development of various financial service offerings such as e-commerce-driven financing solutions, online lending services, and traditional commercial banking options. By leveraging a large user base and their unique technological advantages, these offerings utilize their 'long-tail' features to provide customized financial services to SME segments that are often overlooked by traditional financial institutions. Additionally, the combination of blockchain technology and big data helps with the extraction, storage, filtering, alignment, and identification of data, effectively reducing the information asymmetry between lenders and borrowers. This progress not only improves the reliability, comprehensiveness, and accuracy of corporate data but also enables a more rapid and accurate assessment of creditworthiness. Furthermore, digital finance simplifies the loan application process,

thereby enhancing funding efficiency. It allows bypassing traditional financial intermediaries such as commercial banks, providing direct access to information retrieval, identification, screening, and pricing of products, which facilitates transactions between supply and demand entities. Ultimately, financial technology is transitioning from a 'one-size-fits-all' strategy to a 'customized-for-each' framework, which precisely evaluates the risk profiles and present financial circumstances of SMEs, thus achieving effective connections and service provision. This shift allows for high-precision profiling. Through online trading platforms, supply and demand entities can engage without the constraints of time or location, optimizing transparency and symmetry of information. As a result, this promotes accurate marketing, a variety of services, and individualized recommendations, greatly enhancing the efficiency of capital optimization [12].

3.4 Cultivating Intellectual Property in Small and Medium Enterprises, Stimulating the Initiative of Financial Institutions, and Reducing the Service Costs of Financial Institutions

The task of pricing intellectual property appropriately turns out to be a significant hurdle when it comes to securing financing for such assets. This is especially true for small and medium-sized enterprises (SMEs) which usually don't have abundant resources. Due to the inbuilt uncertainties associated with valuing intellectual property, a pricing strategy that's guided by market conditions is really necessary to handle the complications of valuation and financing in an effective way. It's a good idea to set up regional platforms for the operation of intellectual property. These platforms should focus on providing all-round services to SMEs. Such services could cover things like patent assessments, technology transactions, and finding suitable financing options. The platforms also ought to work on strengthening the intellectual property management capabilities of SMEs and come up with mechanisms for result transformation that fit their specific development requirements. To improve the supervision of intellectual property agencies and service organizations, it's crucial to put into practice standardized service protocols for SMEs [13]. This will help ease the confusion in valuations that might otherwise make things even more challenging for them. Also, by developing financing insurance products that take into account the asset-light features of SMEs, a detailed risk-sharing framework can be created. This framework would enable financial institutions to offer targeted financing support to SMEs, making it easier for the liquidity of intellectual property to improve and keeping the risk levels manageable. It's also recommended to expand the intellectual property trading market through regional pilot projects, along with policy incentives like tax breaks for technology transactions involving SMEs. By making use of market-driven trading mechanisms, a fair price discovery process can be set up, effectively achieving the whole chain of intellectual property from output production to financial conversion for SMEs. This way will help match the innovative elements with financial resources, eventually building a mutually beneficial intellectual property financing ecosystem for everyone involved. What's more, it's essential to actively look into the combination of different investment and loan models, together with investment-insurance-loan frameworks, creating a path where venture capital injections come before commercial banking loans. This approach deals with the limitations that commercial banks face when it comes to valuation and risk assessment. Besides, it's important to promote cooperation between intellectual property operation firms and insurance providers to set up a patent insurance risk assessment system and develop financial products related to intellectual property insurance. Strengthening the partnerships between financial institutions and external intellectual property service providers will also be beneficial in jointly creating intellectual property pricing models, thus providing specialized technical support for those professionals who are involved in intellectual property pledge initiatives. Through government procurement of services, qualified third-party data firms are engaged to comprehensively utilize methods such as on-site household interviews and digital surveys. These firms employ big data

technology to enhance investigations of key business districts, industrial parks, specific industry sectors, and the upstream and downstream micro-markets of core enterprises. Such strategies facilitate the efficient and accurate amalgamation of multidimensional information concerning micro and small enterprises within this sector. Furthermore, by employing techniques like data mining, risk assessment, and evaluation of micro and small businesses across various industries and stages of development, the findings and results of the analysis are shared with pertinent financial institutions. This ultimately fosters the growth of prospective small and medium enterprise clients, customized services, and the creation of risk management solutions. This initiative aids small and medium-sized enterprises in unifying every facet of their ideal customers' procurement, production, and sales workflows, thus dismantling "data silos" and paving the way for a novel paradigm of scenario-based financing services. As a result, it lowers both internal and external expenses for financial institutions catering to small and medium-sized enterprises [14].

4. Conclusions and Policy Recommendations

This paper looks into how financial innovation impacts the innovation processes of small and medium-sized enterprises (SMEs) situated in marginalized areas. The research findings show that, first off, the carrying out of pilot policies that help bring technology and finance together really promotes innovation and economic growth within SMEs, having a lasting good influence on the substantive innovation in these organizations. Second, the policies regarding technology finance enhance the innovation quality among SMEs in marginalized regions by dealing with the problems of 'difficult and expensive financing' and lessening the positive externalities related to substantive innovation. Third, it's quite important for government agencies to actively back the growth of the venture capital sector. They should encourage banks and venture capital firms to work together to create innovative lending technologies like 'investment-loan linkage', set up platforms for integrating venture capital with SMEs, and create favorable conditions for cooperation between venture capital and commercial banks. These strategies will enable venture capital to play a more crucial role in alleviating the financial constraints faced by SMEs (including those in the growth stage, non-state-owned businesses, and manufacturing firms), reducing loan default risks, and improving the distribution of bank credit resources [15].

The proposed policy suggestions are laid out as follows: First off, for small and medium-sized enterprises (SMEs), particularly those situated in areas where the banking systems aren't well-developed, those engaged in high-tech fields, or privately-owned entities that are facing more severe credit restrictions, it's advisable for them to actively look for venture capital. This way, it can not only bring about direct equity funding and offer valuable services like management consulting, but also contribute to improving the later loan situation, thereby considerably alleviating the financing hurdles. Meanwhile, SMEs need to make their financial systems more formal and boost the quality of their financial data so as to reduce the information imbalance with banks. This improvement will enhance their access to bank loans and cut down on the extra borrowing costs associated with the risks arising from information asymmetry. Second, to promote enterprise innovation and cultivate a favorable institutional environment, it's essential to create a synergy between an active government and an effective market to widen the financing channels. This demands a comprehensive reform of the sci-tech financial system, making use of the government's role in providing loan interest subsidies and reducing investment risks, while also strengthening the market's main function in setting up a self-sufficient innovation financing framework for enterprises. The establishment of a solid sci-tech financial service platform is of great importance, as it will enhance the financial support mechanisms and actively explore innovative models for financial resource allocation. What's more, speeding up the integration of digital technologies will present more accessible and efficient diverse financing

alternatives, tackling the challenges of 'difficult and costly financing' from both institutional and systemic perspectives, thus 'backing up' the funding of small and medium-sized enterprises. Additionally, perfecting the intellectual property protection system is vital for guaranteeing sufficient returns on the significant innovation efforts made by technology-based SMEs, and for intensifying the innovation-driven impact of technology finance policies. Thirdly, for commercial banks, cultivating clients from small and medium-sized enterprises (SMEs) has turned into a crucial strategy given the increasing competition within the banking industry to enhance their viability and profit margins. These institutions should actively strive to eliminate the biases regarding size and ownership against SMEs and private firms, while also advancing credit assessment technologies to lessen the information asymmetry about SMEs. Carrying out such measures will improve loan risk management and simplify the allocation of lending resources. It should also be noted that the current financial irregularities don't necessarily imply high loan risks. Due to their developing nature, SMEs often focus on growth at the expense of management, resulting in less than ideal quality of financial data. However, this doesn't necessarily mean that SMEs have poor growth potential or increased loan risks. Banks should not disregard the significant number of SME clients based on these considerations. Instead, they must skillfully utilize alternative 'soft' information sources to evaluate the quality of these enterprises. For instance, engaging venture capital involvement as a signal of certification can effectively help in identifying and distinguishing high-quality SMEs, which in turn minimizes the costs tied to information gathering for loan approvals. This method will allow banks to effectively assess and manage loan risks associated with SMEs, ultimately improving the allocation efficiency of credit resources. By embracing this approach, banks can achieve the goal of boosting loan distributions to private enterprises, particularly SMEs, in this new era, while ensuring both quality and quantity. Fourth, it is essential to enhance the specificity, depth, and coherence of policy formulation to fully leverage the long-term incentivizing effects of science and technology finance on the innovation of small and medium-sized enterprises (SMEs). In the policy formulation process, it is crucial to consider the development stage, nature of property rights, and industry characteristics of SMEs, thereby improving the alignment among the objectives, tools, and targets of science and technology finance policies. Building on the implementation of differentiated policy measures, it is important to further enhance the precision of these policies. Concurrently, efforts should be made to direct more financial resources towards technological innovation activities, promoting a moderate bias of science and technology finance resources towards growth-stage enterprises, private enterprises, and manufacturing sectors. This approach aims to optimize the innovation structure and maximize the innovation-driven effects of science and technology finance policies, thereby effectively unleashing new momentum for economic growth.

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