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How Does China Build Its Fintech Strategy? A Perspective of Policy Evolution

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Abstract: Understanding the layout of China's fintech policy planning from the perspective of policy science theory will help policy makers to fully understand the current development stage and evolutionary path of fintech and improve the implementation of fintech policies and the promotion of their effects. This study examines 120 fintech policies issued at the national level from 2017 to 2022; unifies policy tools, policy organizational structure, and policy effectiveness into a three-dimensional scientific policy analysis framework; and uses a text content mining method to provide a quantitative analysis of China's current fintech policy system. In terms of the choice of policy tools, there is an unbalanced proportion, with environmental-type policy tools being overused and demand-type policy tools being underused; a network of core institutions for policy promulgation has been formed, with diversified types of subjects. However, overall, the degree of cooperation among various subjects is not high, and some departments closely related to the development of fintech are not involved enough in the publication of cooperation documents. Policy effectiveness depends on the number of policies and their average effectiveness, and the latter has insufficient growth momentum. Given the existing problems, some suggestions are made for optimising policies to develop fintech.

Keywords: fintech; policy text; three-dimensional analysis framework; quantitative analysis

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1. Introduction

Fintech was introduced for the first time in the 1990s by the Financial Services Technology Consortium, a development project that was initiated by Citibank [1]. In 2016, the Financial Stability Board (FSB) published its *Framework for the Description and Analysis of Fintech* report, which for the first time defined fintech as a technology-enabled financial innovation that leads to the convergence of finance and technology to create new business models, applications, processes, and products that have a significant impact on financial markets, financial institutions, and the way financial services are delivered. In recent years, the use of fintech has emerged and grown at an alarming rate globally. With a booming fintech sector, high Internet penetration rate, and large numbers of users, China has evolved into one of Asia's largest fintech hubs [2,3]. In related areas, such as payments, wealth management, and online insurance, fintech is developing much faster in China than in the US [4]. In transactional terms, China is now an almost cashless economy [5]. Fintech rapidly turned China from a primarily cash-based, backward financial system into a global fintech leader [6], and has increasingly become an important guarantee for China's economic transformation, upgrading, and sustainable development. At the same time, it guides financial resources to green industries and promotes the sustainable development of the ecological environment. Nevertheless, fintech has not changed the risk attributes of financial business [7]. Rather, the strong professional characteristics of IT make financial risks more hidden and complex, and IT and operational risks have become more prominent [8,9]. In this context, the Chinese government and financial-related departments clearly attach great importance to top-level deployment requirements [10]. First, the Financial Technology

Committee was established in 2017, followed by the orderly promotion of pilot financial technology applications in 2018 and the release of the Financial Technology (FinTech) Development Plan (2019~2021) in 2019, which for the first time outlined a global plan for the development of financial technology. The successive issuance of relevant policy documents has increasingly refined the development of the fintech market [11].

In a socialist market economy with Chinese characteristics, which combines a 'competent government' and an 'effective market', the government, as the main implementer of policies and the main provider of people's welfare, has a profound impact on the development of fintech in China [12,13]. The efficient promotion and sustainable development of fintech depends on a favourable development environment and the scientific and rational use of policy instruments. However, what policy tools are currently being used in China to promote the implementation of fintech policies? Is the choice and mix of policy tools well-structured? What are the logic system and internal structure behind policy release? How is fintech policy performing in terms of effectiveness? To answer these questions, it is necessary to focus on fintech policy itself and examine the policy formulation logic and practice path. Since policies usually appear in the form of texts, the analysis of policy texts is usually inseparable from the study of policies as an object. Unfortunately, there is a clear lack of works in the existing literature that address fintech policies [14,15]. Existing studies believe that fintech has reshaped the financial service model, mainly focusing on the impact of fintech on the economy, including the efficiency enhancement effect of fintech on traditional banks [16], the promotion effect on enterprise innovation and transformation [17,18], and the enhancement effect on household financial inclusion [15]. After verifying the positive role of fintech, scholars often point out in their policy suggestions that the government should improve fintech policies in terms of financial support, talent introduction, infrastructure, etc., in order to give full play to the effectiveness of fintech in serving the real economy through a good external policy environment. Although some scholars have noticed the important role of government support in promoting the development of fintech, they have explored the regulatory logic and institutional framework of fintech in China [19] and studied the asymmetric impact of the central government's encouragement and regulation policies on fintech innovation through empirical analysis [20]. However, investigations are generally limited to superficial descriptions and comments of policies [21], and it is difficult to find ones that can provide an in-depth analysis of relevant policies, especially quantitative analysis based on the perspective of policy texts, which provides a possible breakthrough space for this paper [22,23]. Therefore, this work takes policy texts as the entry point to conduct an in-depth analysis of existing fintech policies; dissect the distribution of policy tools, the cooperation network of issuing institutions, and the intensity of policy effectiveness in the construction of fintech; and provide a theoretical basis for promoting the soundness and optimization of China's fintech policy system. Moreover, it can provide information for other countries interested in developing financial technology.

The contribution of this research is multifaceted, which can be expressed as: (1) Using the method of text analysis to comprehensively understand the content, focus, and shortcomings of China's fintech policy has theoretical and practical significance for improving China's fintech policy system and realizing the sustainable development of fintech. (2) Based on a three-dimensional analysis framework of policy tools, policy organizational structure, and policy effectiveness, this paper makes a quantitative analysis of China's current fintech policy system and scientifically and accurately analyses the internal logic and development trend of China's fintech policy. (3) A quantitative standard for the effectiveness of fintech policies is constructed, and the effectiveness of China's fintech policies is quantified and evaluated. The subjectivity of policy evaluation is reduced to identify the advantages and disadvantages of current policies and provide suggestions and decision-

making references for the improvement and optimization of relevant policies. The rest of this paper is organised as follows: Section 2 presents the methodology; Section 3 offers a quantitative analysis of policy texts, policy organisational structures, and policy effectiveness; Section 4 outlines the stages of development of China's fintech policy; Section 5 summarises the conclusions and provides recommendations for further research.

2. Methodology

2.1. Analytical Framework

In contrast to the previously applied social sciences, Lasswell, the founder of policy science theory, views policy science as a science of democracy [24]. With the gradual deepening of public policy research, in order to make up for the shortcomings of the subjectivity and uncertainty of policy interpretation, quantitative research on policy texts has become an emerging topic in the field of policy science in recent years. It takes the content and attributes of policy texts as the research object. It can also accurately and quantitatively present the process of policy change, thus making up for the subjectivity and uncertainty of qualitative research [25] and providing a new scientific method for carrying out policy analysis. Hence, this research will examine China's fintech policies on the basis of a quantitative analysis of policy texts. The formation and implementation of policy texts show cooperation and game behaviour among different government agencies [26,27]. In particular, policies jointly issued by different government agencies can highlight the complex and delicate interagency relationships among joint agencies, that is, the policy organizational structure. Specifically, policy content, organizational structure, and effectiveness are the main components of the policy scientific analysis paradigm [2].

Among these items, the focus of policy content analysis includes policy subjects, objects, and tool contexts, and the common methods include content and comparative research analysis, as well as model construction and case studies. This work focuses on the content of the policy subjects, organizational structure, and tools. The research methods mainly include content and social network analysis, in addition to policy effectiveness quantification. In terms of policy effectiveness, a three-dimensional quantitative model of policy effectiveness that includes policy intensity, objectives, and measures is established based on the above-mentioned results to quantitatively analyse the content, strength, and influence of each policy text. Therefore, this paper unifies the three dimensions of policy content and effectiveness analysis, as well as policy organizational structure, into a framework of fintech policy evolution analysis to systematically understand the mechanisms and evolutionary trends of the fintech policy system [27]. The framework covers four parts, including data acquisition and preprocessing, model construction and data analysis, depth analysis, and results analysis and discussion, as shown in Figure 1.

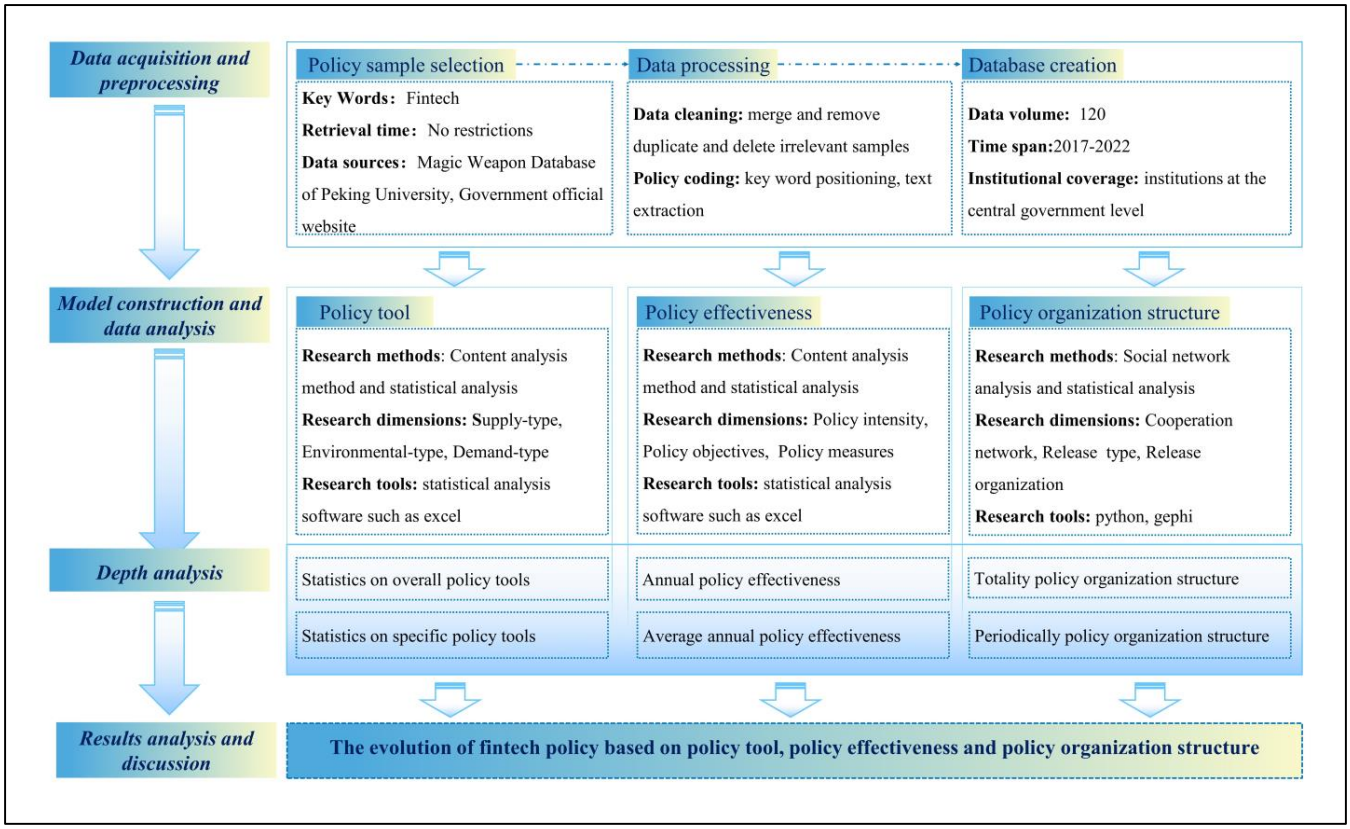


Figure 1. Research framework.

2.2. Data Acquisition and Preprocessing

2.2.1. Policy Sample Selection

Given the large regional differences in Chinese cities, the heterogeneity of the economic level, information construction foundation, and other factors is evident, and the development stages of fintech are different. To ensure the rationality of the research design, this study does not aim for a panoramic coverage of policy samples but focuses only on fintech-related policies issued at the national level. In addition, in 2017, the global fintech industry exploded into full swing, and China's fintech development also entered the fast lane. The establishment of the FinTech Committee in May of the same year marked the official start of the deployment of China's fintech strategy at the government level. Therefore, this paper takes 1 January 2017 to 1 January 2023 as the research window. The Magic Weapon Database of Peking University and government websites related to urban construction were searched using 'fintech' as the keyword [28]. Then, after deleting duplicate and irrelevant policy samples, as well as screening and sorting, 120 fintech-related policy documents were obtained from 55 institutions and departments.

2.2.2. Policy Sample Code

To facilitate the numbering of the 120 selected policy texts, specific policy clauses in the policy texts were taken as the basic analysis unit. According to the above-mentioned three-dimensional analysis framework, the types of fintech policy tools and their policy effectiveness were identified and quantified according to the 'Date of issue–Code' method. A coding table covering 120 fintech policy samples was formed, as shown in Table 1.

Table 1. Code table of fintech policy samples.

Date of Issue	Policy Name	Content Analysis Unit	APE	Types of Policy Instruments	Name of Policy Instrument	Code
2017.05	*Notice of the People's Bank of China, the Banking Regulatory Commission and the Securities Regulatory Commission on the Release of the Development Plan for the Construction of the Standardization System in the Financial Sector (2016~2020)*	… Strengthen the regulation of financial technology and risk prevention and control standards development, the development of … financial technology and other areas … standards to improve the accuracy of risk prevention and control.	5	Environmental type	Regulations and standards	2017-1-1
…	…	…		…	…	…
2019.12	*China Banking and Insurance Regulatory Commission's Guidance on Promoting High-Quality Development of the Banking and Insurance Industry*	… Explore the application of fintech in customer credit evaluation, credit access, etc … … Study and develop a regulatory system for fintech companies to strengthen the supervision of emerging financial businesses and industries …	14	Environmental type Supply type Supply type	Strategic measures Infrastructure development Basic research support	2019-24-1 2019-24-2 2019-24-3
…	…	…	…	…	…	…
2021.03	*Opinions of the State Council on the division of key tasks for the implementation of the Report on the Work of the Government*	… Strengthen the regulation of financial holding companies and fintech to ensure that financial innovation is carried out under prudential supervision.	16	Environmental type	Regulations and standards	2021-5-1

For example, the code '2017-1-1' refers to the first fintech-related policy document issued in 2017, and the final digit refers to the first policy tool of this policy. The identification method for policy instruments and the calculation principle for the annual policy effectiveness (*APE*) will be introduced in detail later. Finally, to ensure the credibility of the policy text coding, two graduate students engaged in fintech-related research were invited to conduct independent coding tests on the selected policy samples. If the coding results were consistent with the original coding results, it was marked as '1'. Otherwise, it was marked as '0'. After the coding was completed, the two coders separately recorded their own coding conditions and used the inter-rater reliability test to ensure the objectivity and accuracy of the coding results. In other words, two coders compared their coding results after back-to-back coding (encoding in a double-blind way). If the inter-rater agreement for coding is high, it suggests a greater level of reliability among the scorers in this study [29]. After calculation, the consistency levels of the test results of the two coders and the original coding results were 87.29% and 81.37%, respectively, which are more than 80%, thus indicating that the coding result of the policy text is acceptable [30].

2.3. Model Construction and Data Analysis

2.3.1. Quantitative Analysis of Policy Tools

Currently, with the development of policy science and the continuous enrichment of policy knowledge systems, research methods for policy texts have become more diversified, and the quantitative analysis method of policy content has attracted increasing scholarly attention [31,32]. The quantitative analysis of policy content is a systematic semantic recognition method that combines quantitative and qualitative methods for policy text content. This method is oriented by policy issues and can analyse some important characteristic variables in policy text content, thereby discovering the hidden rules of the policy choices and changes contained in the text. In the field of policy research, a certain dynamic link exists between the promulgation process and policy content. Moreover, policy content provides the possibility and means for studying this link. In a sense, the quantitative analysis of policy content can be seen as a collection of different theoretical perspectives for analysing policy texts, which includes not only partial quantitative thematic analysis in the traditional sense, but also qualitative analysis of the information behind the policy literature. The method's combination of qualitative and quantitative research makes up for the disadvantages of traditional policy research, that 'only pays attention to organizational entity structure and behaviour' and ignores specific social situations and content details [33], which helps to improve the breadth and depth of management policy analysis.

2.3.2. Quantitative Analysis of Policy Effectiveness

At present, quantitative research on policy is still in its infancy, and existing studies on policy evaluation focus on subjective value judgements and lack scientific and intuitive empirical approaches [34]. The quantitative model based on policy effectiveness refers to the evaluation of the content strength and influence of a single policy text. This work helps to make up for the shortcomings of the subjectivity and uncertainty of policy interpretation and can grasp the policy expression and effectiveness, as well as the phase evolution of China's fintech from a macro perspective. To measure the policy effectiveness, this paper has established a multidimensional quantitative model of policy effectiveness, which is evaluated from three aspects: policy intensity [35,36], objectives [37], and measures [38]. Policy intensity depends on the level of the policy-issuing agencies. In addition, policy objectives and measures depend on clear objectives. Although policies such as accelerating enterprise innovation and promoting household consumption are both relevant to building fintech, these have different focuses and levels of relevance. The scores for policy objectives are determined according to the correlation between political strategy and fintech. Finally, the quantitative framework for policy effectiveness is constructed from three dimensions.

2.3.3. Social Network Analysis

Social network analysis is a scientific method for studying actors and their relationships in society [39,40]. A complete social network includes multiple nodes and connections. The dots represent 'social actors', which can be used to refer to government departments or policy texts in the policy context, and the connection between any two points represents the relationship between the issuing agencies of a specific policy text [41]. Compared with other methods, social network analysis pays more attention to the interaction between different nodes (actors) and can more objectively judge the position and relationship of each node in the cooperative network [42]. In this study, given that most of the fintech policies are formulated by government departments, a relatively complete policy system was formed, and the huge network of policy-issuing organisations generated complex intragovernmental relations. Currently, the social network analysis method is more applicable. In China's fintech construction process, the participants are diverse and relatively complex. According to the specific needs of financial market development and governance, different government agencies have issued a series of policy documents individually or jointly. On the basis of these policy documents, this study uses the social network analysis method to investigate the issuing agencies of policy documents, present the characteristics of the cooperative relationship networks among these agencies in China, and reveal the evolutionary mechanisms and processes in different types of interagency relationship networks [43].

2.4. Depth Analysis, Results Analysis, and Discussion

Based on model construction and simple descriptive statistics, the research carries out in-depth analysis in three dimensions, considering policy tools, effectiveness, and organizational structure. First, this study establishes an analysis framework covering supply-type, demand-type, and environmental-type policy tools, and analyses their use in the introduction of fintech-related documents by government departments. In terms of policy effectiveness, it systematically explores the content strength and influence of policy texts by analysing the *APE* and the average annual policy effectiveness values (*AAPE*). Finally, it considers the overall policy organizational structure and the staged policy organizational structure, including the impact on the government. The cooperation network and cooperation intensity between departments are analysed.

3. Quantitative Analysis of Policy Texts

3.1. Policy Tools Analysis

The policy object will be regulated and changed by regulatory or incentive measures from the policy subject [44], and the adjustment measure is the policy tool. Policy tools can be defined as both an 'object' and an 'activity' [27,45,46]. The existing research on the classification of policy tools is mostly derived from the ideas of Roy Roswell and Walter Ziegfeld [47]. Based on the dimensional differences in the impact of policies on technology, they divided technological innovation policy instruments into the supply, environment, and demand types. The simplified path of the three policy tools for the construction of fintech is shown in Figure 2 [27,48]. Among the tools, the role of supply-oriented ones is mainly reflected in the driving force of policies on the development of fintech, that is, directly expanding the supply through the support of scientific and technological information, infrastructure construction, capital, and personnel investment to construct and promote the advancement pace of fintech [48,49]. The main function of environmental policy tools is to improve the impact of the external environment on the construction of fintech. Specifically, the government influences environmental factors by formulating policies in areas such as goal planning, finance, taxation, and finance to provide a favourable policy environment for the development of fintech, eliminate market barriers, and indirectly affect and promote the construction pace of fintech [50,51]. The driving force of demand-oriented policy tools is mainly reflected in the pulling force of policies on fintech, which means that the government, through procurement, state-owned enterprises, and other agencies,

can promote the development of international exchanges and cooperation of fintech, as well as encourage demonstration measures to create market demand and reduce market uncertainty to promote the progress of fintech [52].

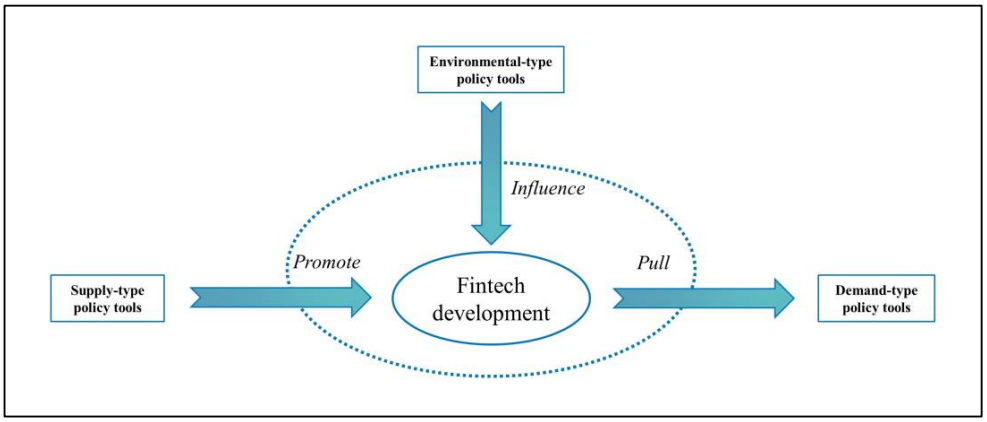


Figure 2. The effect of policy tools on fintech development.

Specifically, each type of policy tool contains a variety of classification methods. In the policy-making process, government agencies can flexibly select different classification methods according to the goal planning and administrative objects to accelerate the development of fintech. Similarly, the reasonable classification of policy instruments is a key step in policy content analysis. On the basis of the classification of Roswell and Ziegfeld, combined with the research object, this study designed an analysis framework that includes three types of policy tools (supply-type, demand-type, and environmental-type), thus covering a total of 14 policy tools [27], such as science and technology information support, public service, communication and cooperation between subjects, and encouragement and publicity. The classifications and their specific meanings are shown in Table 2.

Table 2. Classification and definition of policy instruments.

Category	Policy Tools	Definition
Supply type	Basic research support	The government explores and researches the standard construction and application innovations of financial technology by setting up platforms, awards, or projects
	Infrastructure construction	Require or encourage relevant departments, enterprises, and financial institutions to strengthen the scientific and technological support and carrier construction for the development of financial technology.
	Public service	The government must provide various supporting services to ensure the smooth implementation of fintech construction activities.
	Talent training	Provide vocational education and skills training for relevant technical personnel and management personnel.
Environmental type	Goal programming	To promote the construction of fintech, make a general description and outline of the goals and prospects.
	Regulations and standards	The formulation of a series of laws and regulations, standards, and other norms of market behaviour helps create a fair and orderly environment for the construction of fintech.
	Strategic measures	Encourage and provide detailed guidance to financial institutions to use financial technology to enhance the way and efficiency of financial services and promote exchanges and cooperation with multiple entities, such as rural finance, green finance, and SMEs.
Demand type	Tax benefits	Tax relief for companies or financial institutions engaged in key areas of financial technology or conducting innovative research and development.
	Government procurement	Government directly or in coordination with other purchasers to promote innovation and adoption of fintech in the form of consumption.
	Encourage publicity	The government has encouraged or promoted the expression in the document to guide enterprises and the public, etc., to actively learn and use financial technology.
	Pilot demonstration	Establishing pilot financial technology innovation to promote the landing and application of cutting-edge innovations.
	External contracting	Government agencies entrust R&D innovation and curriculum building to companies or research institutions to promote innovation in financial technology

Based on the above classification ideas, this study examines the frequency statistics of the policy tools involved in fintech-related policies. The results are shown in Figure 3.

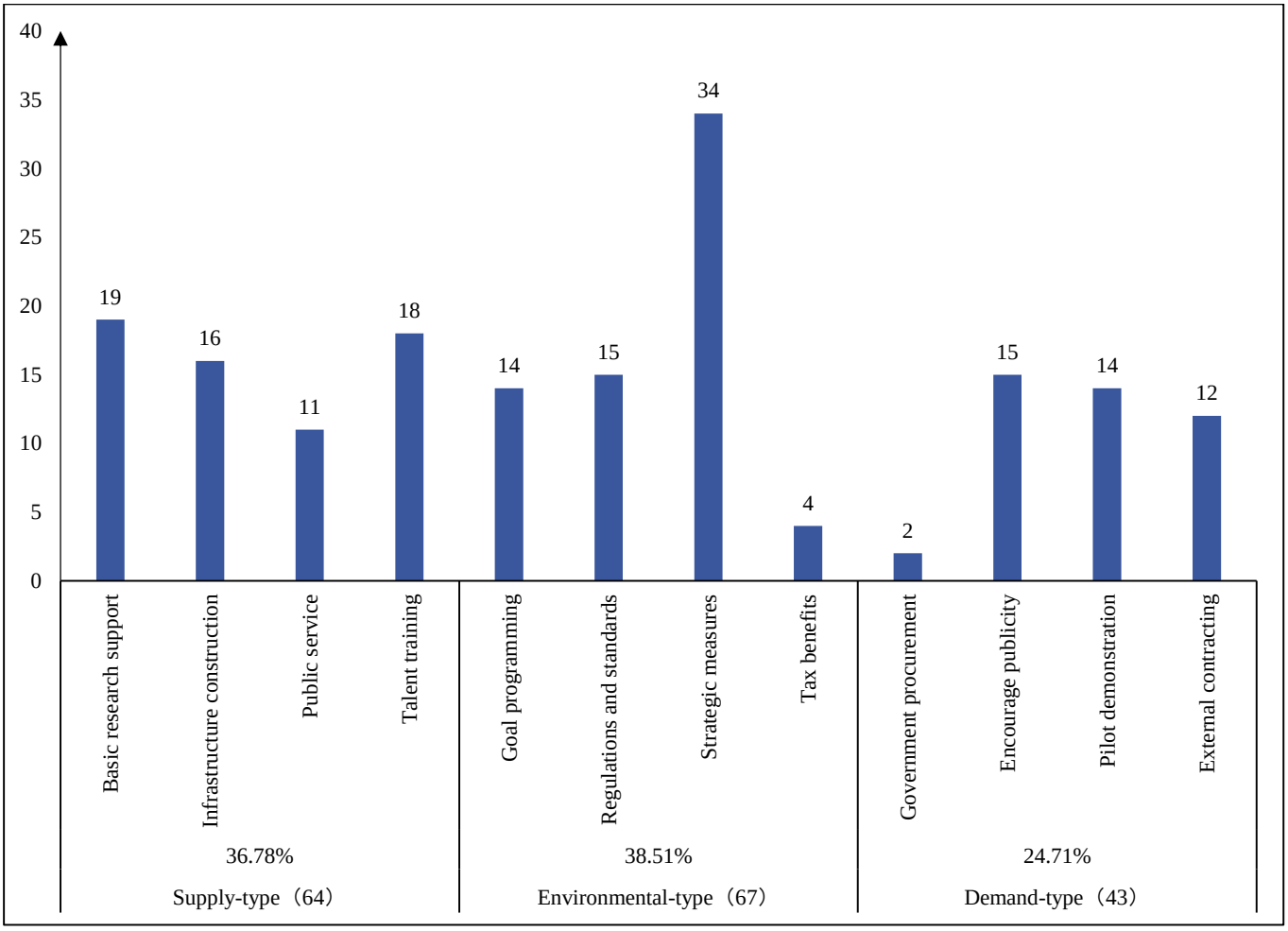


Figure 3. Statistics of the use frequency of fintech policy tools.

3.1.1. Overuse of Environmental Policy Tools and Imbalance in the Use of Secondary Policy Tools

As fintech is still new and rapidly developing in China, the government lacks a deep understanding and overall grasp of the inner laws of fintech. For this reason, the intensive use of environmental policy tools by government departments reflects an urgent demand to make up for the lack of previous policies and to effectively improve the development environment. In terms of the internal composition of environmental policy tools, strategic measures are the core element of this type of policy tool, accounting for 50.75%, while the use of regulations and standards and goal programming are far from strategic measures, accounting for 22.39% and 20.90%, respectively. In terms of secondary policy tools, strategic measures are a short-term government action to quickly implement or improve a system and have strong encouraging and supportive characteristics. The high-frequency use of this policy tool reflects the government's emphasis on optimising the construction of the fintech environment and strengthening the widespread application of fintech. As the same policy content is repeatedly emphasised in different policy texts, there is an overflow of the application of strategic measures policies.

3.1.2. Supply-Oriented Policy Tools Are Moderately Applied, While Secondary Policy Tools Are Unevenly Distributed

Statistics show that among supply-type policy tools, basic research support accounts for the highest percentage, at 29.69%, followed by talent training (28.13%) and infrastructure development (25%). The government attaches great importance to basic research related to fintech and is fully aware of the supporting role of basic research for the establishment of fintech standards and innovation applications. Talents, as the most active element in productivity, provide important support for fintech research work and related activities and are the driving engine for fintech to achieve sustainable development. Therefore, the government attaches more importance to talent cultivation. In addition, infrastructure, as an important cornerstone of fintech development, has also received close attention from the government. It is worth noting that the current policy focus on public services is relatively weak, with a usage ratio of only 17.19%, and the various service facilities supporting fintech need to be strengthened and improved.

3.1.3. Demand-Type Policy Tools Are Not Used Enough, and the Structure of Secondary Policy Tools Is More Balanced

Demand-type policy tools emphasise the government's demand-oriented approach to promoting the scale development of fintech, which is often more direct and effective than environmental- and supply-type policy tools. However, among the three types of policy tools, the percentage of demand-type policy tools used is only 24.71%. It is not conducive to mobilising the initiative and enthusiasm of social forces to participate in fintech activities. Furthermore, among the demand-type policy tools, encouraging the application of publicity (34.88%) is followed by pilot demonstration (32.56%) and external contracting (27.91%). Obviously, the richness of existing demand-type policy tools is still insufficient, especially the government purchase of services. In the process of using policy tools to encourage publicity, the government mainly encourages enterprises and the public to actively learn and use financial technology in the form of verbal appeals, but their policies lack specific implementation details with operability, and the overall policy direction is rather vague. In contrast, pilot demonstrations, outsourcing, and government procurement have more direct practical significance. The above initiatives not only mobilise enterprises and other social organisations to participate in financial technology innovation, but also reduce the pressure on the government in terms of technology, personnel, and finance while each institution utilises its own strengths, so that resources can be effectively allocated.

3.2. Policy Organizational Structure

As the release of policies often involves system reform, finance and taxation, human resources, and other content modules, agencies often have difficulty formulating a scientific, reasonable, and effective policy when relying only on the power of an administrative department or a certain institution [45]. Therefore, an analysis of the real interactive and synergistic effect of the issuing agencies can more clearly determine the cooperative relationships and organisational structures behind a policy text, which is helpful in forming the resultant force of the policy and better exploiting the established effect. This study uses the Gephi 9.1 software to visually examine the organisational structure of the relevant policy issuers to analyse the cooperative relationships between and characteristics of various government agencies.

3.2.1. Policy Subject

The 120 fintech-related policies selected for this study originated from a total of 55 institutions and departments. In order to highlight important issuing institutions, the analysis evaluated the importance of issuing institutions with the help of the Pageranks algorithm that comes with the Gephi software and filtered the core sub-networks by ranking the top 10. As shown in Table 3, the *People's Bank of China*, *China Banking and Insurance Regulatory Commission*, *Ministry of Industry and Information Technology*, *State Administration*

of Market Supervision and Administration, *Ministry of Agriculture and Rural Affairs*, *Ministry of Commerce*, *China Securities Regulatory Commission*, *National Development and Reform Commission*, *Ministry of Finance*, and *Ministry of Ecology and Environment*, were the top 10 core institutions issuing fintech policies. In addition, in order to classify the characteristics of the 55 issuing institutions, this paper uses a modularity algorithm (modularity class) to identify the node types, and then categorise them into different classes. The issuing institutions are classified into two classes. Among the top ten, except for the *Ministry of Agriculture and Rural Affairs*, *Ministry of Commerce*, and *Ministry of Ecology and Environment*, which are in one class, the other seven issuing agencies can be classified into the same type.

Table 3. Top 10 government departments with core fintech policy releases.

No.	Name of Institution	Pageranks	Modularity_Class
1	People's Bank of China	0.056708	0
2	China Banking and Insurance Regulatory Commission	0.053693	0
3	Ministry of Industry and Information Technology	0.049179	0
4	State Administration of Market Supervision and Administration	0.049179	0
5	Ministry of Agriculture and Rural Affairs	0.042931	1
6	Ministry of Commerce	0.036744	1
7	China Securities Regulatory Commission	0.036232	0
8	National Development and Reform Commission	0.035838	0
9	Ministry of Finance	0.035679	0
10	Ministry of Ecology and Environment	0.031315	1

3.2.2. Type of Publication

The form of policy release can be divided between the individual and joint types according to the cooperation between the issuers. The number of joint releases from multiple departments can, to a certain extent, characterise the degree of importance the government attaches to the development of fintech and its important position in socio-economic activities. Among the 120 collected fintech policy texts, the number of individually issued policies was 70 (58.33%), and the total of jointly issued policies was 50. The difference between the two forms of publication is relatively dramatic, showing that individual issuance is dominant and joint issuance is supplementary. With the continuous development of fintech, due to its informational characteristics and financial attributes, the process of policy formulation and implementation requires not only the macro-guidance and strong promotion of the *National Development and Reform Commission*, but also the cooperation of the *Ministry of Industry and Information Technology*, the *Ministry of Finance*, and other specific departments. Over time, fintech-related policies issued jointly gradually increased, and the numbers of both types were consistent in 2022. As can be seen from Figure 4, according to the time series distribution chart of the form of policy issuance, the proportion of policies jointly issued by various agencies rose each year and exceeded that of individual issuance in 2020. The reason for this is that, on the one hand, as the construction of fintech continues to progress, a scientific, rational, and comprehensive construction plan is more important, and a single functional government department is unable to carry out panoramic policy planning and design. On the other hand, a construction programme involving multiple fields urgently needs close and effective cooperation among multiple government departments to better form policy synergy.

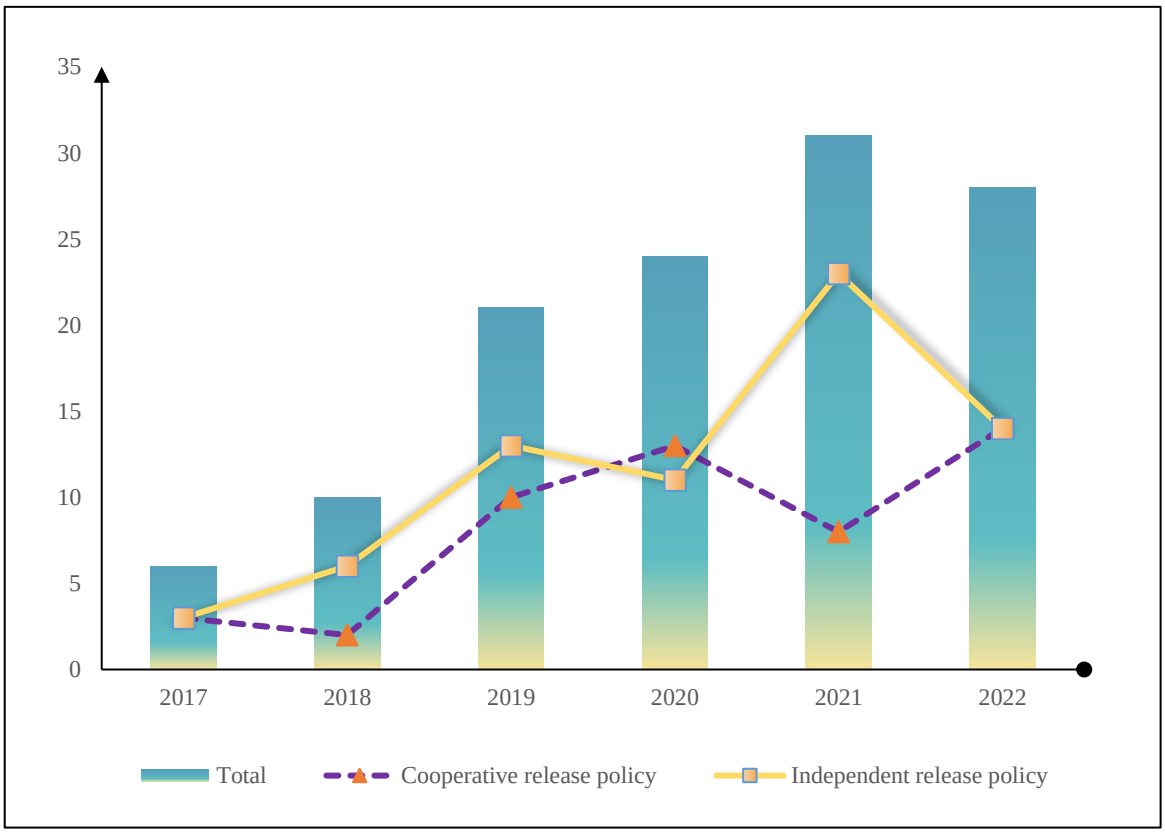


Figure 4. Statistics on the forms of fintech policy release.

3.2.3. Cooperation Network

In the multi-agent cooperation network related to the construction of fintech, as the reform of government systems and the expansion of the coverage of urban construction have deepened, cooperation between government departments has also undergone continuous change due to the reform of government institutions and changes in policy issues [53,54]. On the basis of the cooperation situation of the issuing institutions, this study constructed a co-occurrence matrix of the sending nodes and constructed a graphical representation of the dynamic cooperative relationships among the policy issuers using visual analysis software Gephi 9.1, as shown in Figure 5.

The large number of network nodes in the cooperative network of policy-enacting bodies indicates that multiple policy bodies are involved in the policy construction of fintech in China. Among them, four nodes, namely, the *People's Bank of China*, *China Banking and Insurance Regulatory Commission*, *Ministry of Industry and Information Technology*, and the *State Administration of Market Supervision and Administration*, have large diameters and possess many connections. This indicates that among the policy issuers, a network structure has formed with the *People's Bank of China* as the core and the *China Banking and Insurance Regulatory Commission*, *Ministry of Industry and Information Technology*, and *State Administration of Market Supervision and Administration* as the central nodes, with other policy subjects supporting and cooperating. In relation to the sectoral attributes in practice, the *People's Bank of China*, *China Banking and Insurance Regulatory Commission,* and other four departments are the main ones responsible for fintech innovation and market construction and management at the national level. However, due to the limited policy resource mobilization capacity of specific functional departments, they also need to cooperate with comprehensive management departments, such as the regulatory departments of the *State Council* and the *National Development and Reform Commission*, as well as the special financial management department, the *Ministry of Finance*, in order to make up for the lack of their own administrative power and realise the effect of cross-departmental integration

of multiple policy tools. It is not difficult to find out from comparative analysis that the *State Administration of Foreign Exchange*, *Ministry of Agriculture and Rural Affairs*, *Ministry of Ecology and Environment*, and other departments are connected to the central subject, but the network is relatively sparse. With the promotion and application of financial technology in foreign trade financial services, as well as rural and green finance, in addition to small- and medium-sized enterprises and social security and health, the current structured form of the network of issuing subjects cannot yet meet the development needs of financial technology, and the participation of relevant departments involved in each key area in the cooperative issuance of documents still needs to be enhanced.



Figure 5. Cooperation network of fintech policy-issuing agencies.

3.3. Analysis of Policy Effectiveness

Policy effectiveness is a concentrated expression of the content strength and influence of policy texts [35–37]. The evaluation of policy effectiveness is also a common analysis method in the field of policy science research. As an institutional arrangement, the effectiveness of a fintech policy is difficult to quantify. Nevertheless, foreign scholars have made pioneering attempts to quantify policy content in other fields. American scholar Gary D. Libecap condensed the activities on mineral property rights in Nevada in the United States into a legal change index and quantified the policies for the first time [35]. Building on the evaluation ideas of the above works and starting from the content of a fintech policy itself, this study constructs a quantitative standard for the effectiveness of a fintech policy based on systematic research on relevant policies. Then, it establishes a quantitative model with three dimensions: policy intensity, objectives, and measures. The legal effectiveness of policies is closely related to the level of the leading organisation, in that the greater the legal effectiveness of the policies promulgated by it, the higher the score on policy strength. However, because of a high-level organization's macroscopic influence

on actors, its scores for policy measures and policy objectives are relatively low. In contrast, although the legal effectiveness and policy strength of policies enacted by lower-level institutions score lower, their content is more targeted and their quantitative scores on policy measures and objectives are better. Therefore, the superimposed complementary effects of the three dimensions of policy strength, objectives, and measures can better reflect the actual effectiveness values of policy content compared to a single indicator.

As shown in Table 4, the policy strength P is a measure of the legal effectiveness of the policy, which is used to reflect the influence of the fintech policy; its value depends on the level of the policy-issuing department and the type of policy. It is ordered from 5 to 1 depending on effectiveness. Policy objective G is used to measure the relevance of the policy to fintech: the closer the policy content is to fintech, the higher the score; policy measure M is the methods and means used by the government to achieve the established policy objectives, representing the degree of detail of the measures related to promoting fintech development in the policy text: the higher the specificity of the measures and the intensity of implementation, the higher the score.

Table 4. Quantitative model of fintech policy effectiveness.

Index	Score	Scoring Criteria
Policy strength P	5	Laws promulgated by the National People Congress and its Standing Committee
	4	Joint document of the CPC Central Committee and the State Council; administrative regulations of the State Council
	3	Other documents of the State Council; rules and regulations of the ministries and commissions of the State Council
	2	Other opinions, methods, plans, and regulations of the ministries and commissions under the State Council
	1	Outside of the ministries and commissions of the State Council
Policy objectives G	5	All policy objectives involve the construction of fintech
	3	Part of the policy objectives involve the construction of fintech
	1	The goal of fintech construction has not been put forward
Policy measures M	5	For one aspect of fintech construction, it gives the implementation content, lists the specific measures, and explains it in detail
	4	For one aspect of fintech construction, the implementation content is given in detail, and the specific measures are listed
	3	For the aspects of fintech construction, this study gives the implementation content and lists specific measures
	2	Lists some basic measures and gives a brief implementation of the content
	1	Only from the macro point of view, no specific operation plan exists

Referring to the existing research [22,55], a quantitative model of the annual policy effectiveness (APE) of fintech is established, and the calculation formula is shown in Equation (1). To reflect the effectiveness of a single policy in each year more intuitively, this study also establishes a quantitative model for the annual average policy effectiveness ($AAPE$) of fintech, and the calculation formula is shown in Equation (2).

$$APE_i = \sum_{j=1}^{n} P_j(G_j + M_j) \tag{1}$$

$$AAPE_i = \frac{\sum_{j=1}^{n} P_j(G_j + M_j)}{N_i} \tag{2}$$

In the equation, i is the year of issue; APE_i is the annual policy effectiveness in the i-th year; j represents the j-th policy issued in the i-th year; P_j, G_j, and M_j represent the strength, objectives, and measures scores of policy j, respectively; N_i is the total number of policies issued in the i-th year; $AAPE_i$ is the average annual policy effectiveness in the i-th year. Given that the data in this study use a standard scoring system, the data format is a unified

dimension, and performing standardization is not necessary; hence, the next step can be carried out [56].

As can be seen from Figure 6, in general, the overall effectiveness value of fintech policies at the national level fluctuates, which is relatively consistent with the trend in policy quantity distribution. The average effectiveness of policies is obtained by dividing the overall effectiveness value by the number of policies every six months, which can indirectly characterise the changes in the effectiveness of individual policies during the corresponding time period. Although the magnitude of change is relatively stable over time, its contribution to the overall policy effectiveness cannot be ignored. It is easy to find that when the number of policies decreases, an increase in the average effectiveness value leads to a rise in the overall effectiveness value of policies instead of a drop. When the number of policies and the average effectiveness value grow simultaneously, the overall effectiveness value will increase more than the number of policies. Conversely, a decline in the average effectiveness value will result in a lower increment in the overall effectiveness value than the number of policies. For the overall policy effectiveness, the effectiveness value peaks in 2019. Furthermore, there are two phases in the trend chart where the change in the value of policy effectiveness is most evident, namely from the second half of 2017 to 2019, and from 2019 to 2020. The overall policy effectiveness value climbs rapidly in the former phase and declines rapidly in the latter phase. Given the chaotic situation in China's financial market in the early stage, the regulatory authorities have paid close attention to development in this period [7,8]. On 13 October 2016, the *General Office of the State Council* issued the "Implementation Plan for the Special Rectification of Internet Financial Risks", guiding ministries and commissions to start following up on the special rectification of financial risks in their respective areas of competence. This implementation plan set off a nationwide storm of Internet finance rectification. After that, the central government and its subordinate departments issued a series of policy documents concerning fintech, with the goal of controlling financial market risks and maintaining financial market order.

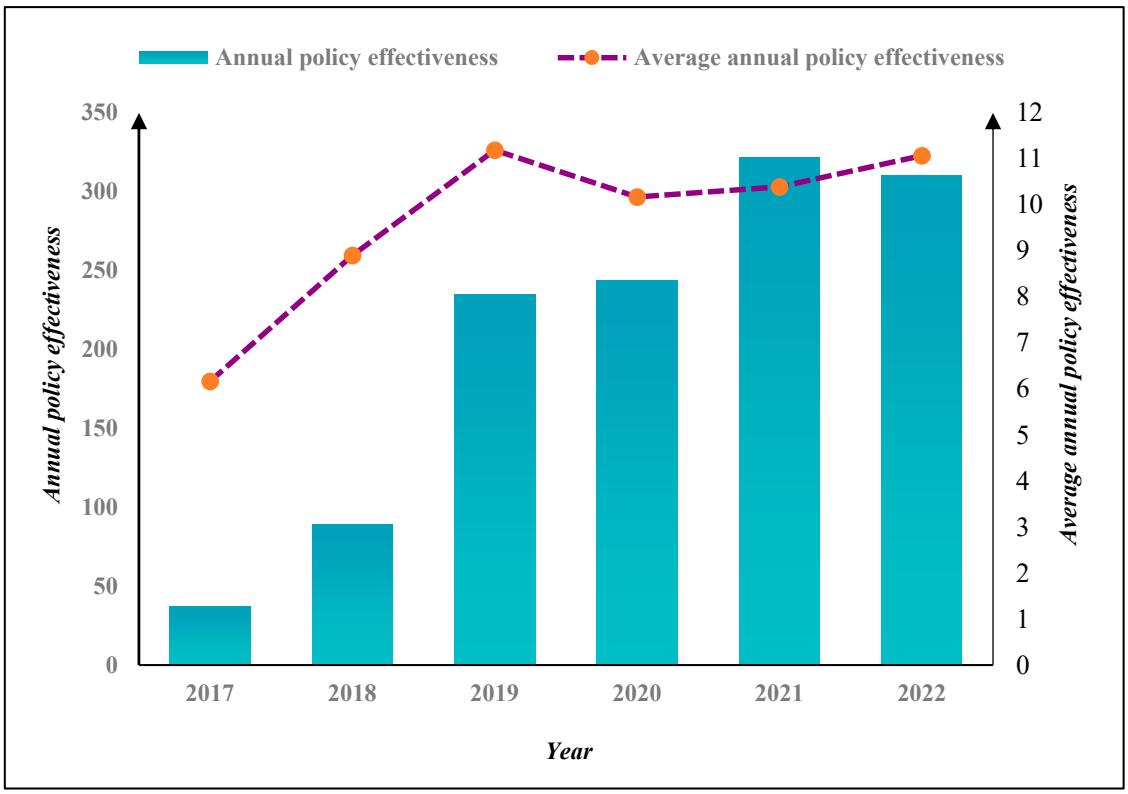


Figure 6. Trend of changes in the effectiveness of fintech policies.

It is worth noting that after 2019, with the rapid expansion of the fintech industry, the policy effectiveness of national-level policies on fintech abnormally showed a significant decline, to some extent mapping the cold effect after the retreat of the fintech construction boom. Prior to this, although there were a number of policy provisions involved in the advancement of fintech and their effectiveness was considerable, they were mostly attached to the policies of other financial entities, and there was no top-level policy document specifically for the development of fintech. In order to realise the integrated planning of fintech and ensure its sustainable development, the *People's Bank of China* released the 'Financial Technology (Fintech) Development Plan (2019–2021)' in August 2019, which was the first global plan for the expansion of fintech at the national level and clarified its development goals, key directions, and main tasks. The direction of the development of fintech became increasingly clearer. After that, in order to promote the implementation of the plan, relevant departments took many measures around the key tasks specified in the plan and introduced a series of policies and measures to support them. However, due to the lack of supervision or feedback mechanisms after the introduction of the special policy on financial technology, the policy lacked flexibility in the implementation process. Moreover, each department has mainly relied on its own understanding of the plan to promulgate policies, resulting in a lack of consistency in policy objectives, so that the average value of policy effectiveness has not provided enough endogenous impetus for growth or sustainability, resulting in a slow improvement in quality. This problem has to some extent hampered the effectiveness of the policy.

4. Analysis of Policy Evolution Stage

As can be seen from Figure 7, using the above research results combined with the number of policies, the types of policy tools, and the stage performance characteristics of policy effectiveness, the macro-promotion strategy at the national level can be analysed. Taking 2019 and 2021 as time nodes, the evolutionary process of fintech policy can be divided into three phases: 2017–2019, 2019–2021, and 2021–2022. The specific evolutionary stages are described below.

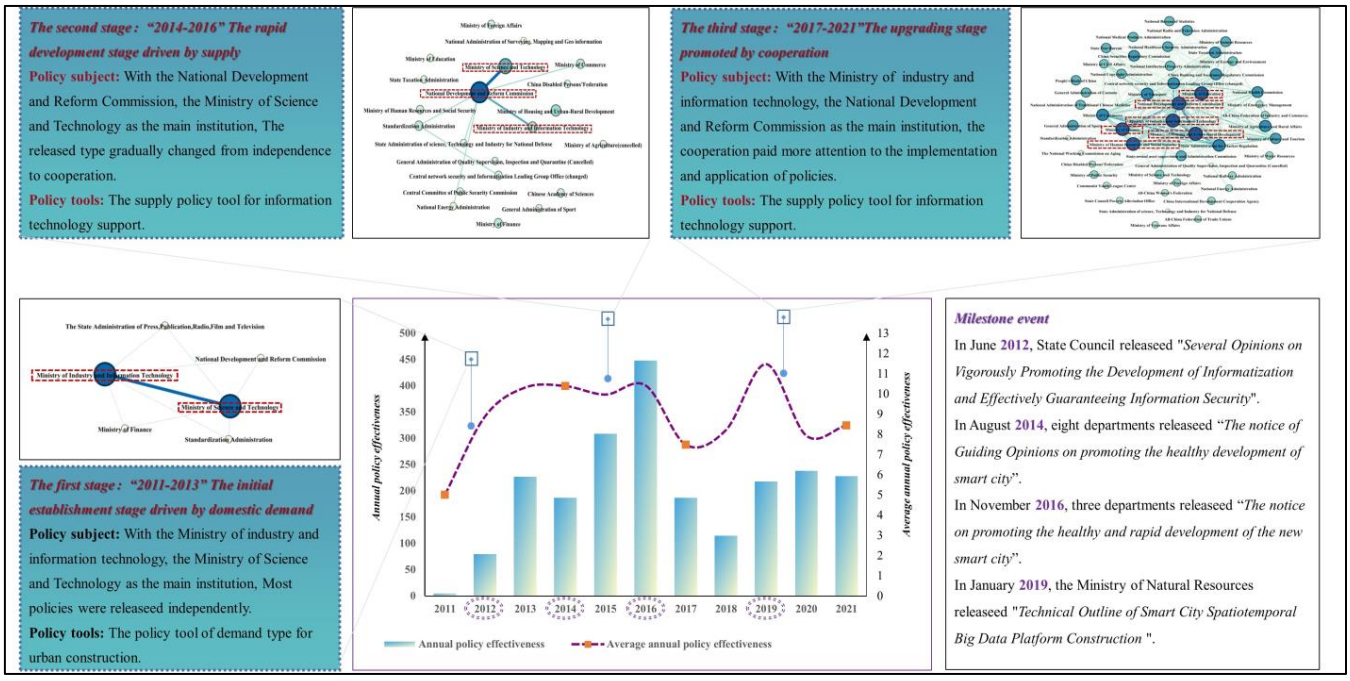


Figure 7. Evolution of fintech policy.

4.1. Initial Establishment Stage Driven by Domestic Demand

In the initial establishment stage, the characteristics of fintech-related policies were embodied as follows: try and explore. At this point, the *People's Bank of China* and the *China Securities Regulatory Commission* were the main contributors to the fintech policies. In addition, most policies were released independently, and no multidepartment cooperation promoting the construction of fintech existed. Policy implementation relied primarily on environmental-type policy tools with a focus on target planning. Through the study of policy texts and the statistics of word clouds and word frequencies, we find that the subject words of policy tools in this period mainly focused on target planning, project research, and promotion-oriented aspects, which to a certain extent reflects that in the early stage of fintech development, the focus of the government system supply level was on top-level design and concept promotion at the macro level. This phase shows a rapid climb in policy effectiveness and illustrates the driving role of the evident system in the early stages of fintech development.

4.2. Rapid Development Stage Driven by Supply

In the stage of rapid development, the characteristics of fintech-related policies were promotion and development. The *National Development and Reform Commission*, *China Securities Regulatory Commission*, *China Banking and Insurance Regulatory Commission*, and *People's Bank of China* were the main subjects of the relevant fintech policies. Moreover, the situation of issuing papers had gradually changed from independent to cooperative. The implementation of policies was mainly based on supply-oriented policy tools for information technology support. In addition, the policy supply in this phase focused on the improvement of fintech standards and norms, and its application scenarios were mainly used for the improvement of financial service quality and technology risk prevention capabilities. The policy texts show that after the initial establishment of the development goals in the first phase, the development of fintech in this phase made more significant progress. In terms of policy effectiveness, it is worth noting that the effectiveness values in this period show a tendency to decrease again after reaching a peak.

4.3. Upgrading Stage Driven by Cooperation

In the third stage, fintech-related policies were characterised by balance and recovery. In this stage, the *National Development and Reform Commission*, *China Securities Regulatory Commission*, *Ministry of Finance*, *China Banking and Insurance Regulatory Commission* and *People's Bank of China* were the main bodies issuing relevant fintech policies. In addition, the issuance of documents was mainly cooperative, and the effectiveness value shows a slow upward trend. The policy supply at this stage also focused on scenario clarification and application promotion, and its application scenarios were mainly used to prevent and resolve financial risks, as well as reduce service costs. After the rapid development of the first two stages, fintech promoted financial inclusion and financial deepening, while also bringing a series of financial chaos that infringed on consumers' rights and interests, seriously disrupting the order of the financial market, overdrawing the consumption capacity of families and individuals, causing various social problems, and threatening financial security and stability. In the stage of connotative upgrading, the characteristics of fintech-related policies were embodied as follows: pragmatism and transformation. After a long period of construction, the policy focus of fintech in this period gradually shifted from planning and design to scenario application. On 23 August 2019, the *People's Bank of China* released the Financial Technology Development Plan, which is the first time that the regulator had laid out the development of fintech on a national scale in the form of a development plan after the they established the Financial Technology Committee in May 2017. After experiencing lenient development and harsh and high-pressure campaign-style adjustments, the regulator, while summarising and reflecting on its regulatory experience, sought to strike a balance between efficiency and safety and between righteousness and innovation and explore a fintech development model more suitable for China's national

conditions. In terms of development, the original pattern of the regulator as a single building body has changed, and fintech is increasingly based on the logic and needs of market transactions, decentralising to some extent to market players, and establishing a fintech development pattern of co-construction and co-management among regulators, market institutions, and the public.

5. Conclusions and Discussion

5.1. Lessons Learned from Previous Policies

Focusing on the theme of fintech policy texts, this study relies on 120 policy text data from 2017 to 2022 and constructs an analytical framework involving three dimensions (policy instruments, organisational configuration, and effectiveness) to explore the textual content and main features of China's fintech policies. The main findings and insights can be divided into three areas.

First, the use of policy instruments is unbalanced, and the internal structure of each policy instrument is unevenly distributed. The usage of policy instruments relies mainly on environmental-type policy tools, with a moderate proportion of supply-type policy instruments used and fewer demand-type policy instruments applied [57]. The application of secondary policy tools, such as regulations and standards, target planning, and public services is relatively low, while tax incentives and government purchase policy tools are lacking. The ratio of policy tools should be adjusted appropriately to optimise the structure of the use of secondary policy tools. This phenomenon has been confirmed by scholars in existing studies [19,58]. If blind optimism about environment-based and supply-based instruments prevails in the process of building fintech strategies, the abuse of policy instruments may be overlooked, while the innovative potential of policies may be stifled [11].

Second, the policy enactment subjects show pluralism and the degree of cooperation among subjects is not high. Among the 120 fintech policies in this study, the policy subjects come from 55 institutions and departments, forming a core network structure centred on the *People's Bank of China*, *China Banking and Insurance Regulatory Commission*, *Ministry of Industry and Information Technology*, and the *State Administration of Market Supervision and Administration*. However, departments closely related to fintech development, such as the *Ministry of Agriculture and Rural Development* and the *Ministry of Ecology and Environment*, are not sufficiently involved in joint policy issuance, which is not conducive to the promotion and application of fintech in other fields [59]. The intensity of cooperation among multiple subjects should be increased to enrich the core network structure of policy subjects. In particular, cooperation between traditional government agencies, financial institutions, and fintech companies should be expanded to minimise financial risks and promote the sustainable development of financial markets [3].

Third, the changes in policy effectiveness mainly originate from the number of policies and average effectiveness, and the latter has insufficient growth momentum. The existing policies have maintained a good trend in terms of quantity, and the average effectiveness value of policies, i.e., quality, has been receiving more attention from the government [60]. However, the real problems, such as the insufficient number of targeted policies, unclear division of labour among departmental agencies, and imperfect policy monitoring and feedback mechanisms have hindered the full utilisation of policy effectiveness and the continuous improvement of the average effectiveness level [61]. The effective release of policy effectiveness can be improved by adhering to the principle of giving equal importance to both the quantity and quality of policies [62].

5.2. Suggestions for Future Policies

First, in conjunction with the current stage of financial technology, the top-level design and the development of targeted policies should be increased. The government should clarify policy objectives and key tasks while effectively ensuring the division of labour between departments to develop policy content with practicality and accuracy. In terms

of ensuring the effectiveness of the policy itself, the formation of synergy between multiple policies should be promoted through reasonable interaction and cooperation among various departments. Second, a policy feedback-monitoring mechanism to ensure the timely implementation and smooth promotion of policies should be established. Various government departments should improve their communication and coordination mechanisms, provide feedback and communication on key issues that arise in the process of policy implementation, and make timely adjustments and amendments to improve the flexibility and relevance of policies. In addition, they should set assessment indicators according to the division of labour and policy objectives, entrust third-party institutions and the media to participate in policy monitoring, conduct regular policy evaluations, and share the results with the relevant departments and the public.

5.3. Limitations of This Work

We must acknowledge the limitations of this study. First, although this paper has screened and identified many policy tools, it may not cover all the ones related to the construction of fintech in China. Second, this work focuses more on policy tools that affect the construction of fintech and neglects information technology and application scenarios that are important to it that are mentioned in fintech policies. In fact, many analyses have discussed Chinese policy tools to solve financial market governance and development problems or improve efficiency from the perspective of fintech demand. One exciting future research direction could be to study the evolution of the fintech policy portfolio. Third, in order to highlight the main findings and stages of policy research more accurately, this evaluation did not discuss how each policy tool interacts with other ones in the policy portfolio. In the future, analysis of the factors affecting the effectiveness of fintech and analysis of the action mechanisms between policy combinations are worthy of further investigation.

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