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Research on the Performance Assessment Mechanism of Accurate Poverty Alleviation in Vocational Education

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ABSTRACT

Vocational education is an effective way to achieve accurate poverty alleviation and get rid of intergenerational poverty. Vocational education is mainly to train skilled talents, not only to provide academic education for the children of poor families, but also to use a skill to achieve employment. It is of great necessity to implement accurate poverty alleviation in vocational education, and performance assessment is a very important part of the accurate poverty alleviation work of vocational education. This paper mainly analyzes the predicament of accurate poverty alleviation in vocational education and the problems in the construction of performance assessment system for accurate poverty alleviation in vocational education, and puts forward measures to improve the accurate poverty alleviation assessment system for vocational education and strengthen the accurate of vocational education.

1. Introduction

The 19th National Congress of the Communist Party of China proposed that targeted poverty alleviation should be one of the three major battles that must be achieved in building a well-off society. President Xi Jinping's instructions on accurate poverty alleviation provide a powerful ideological weapon for poverty alleviation. Vocational education plays an important role in the work of accurate poverty alleviation. Vocational education carries out the work of accurate poverty alleviation not only to enable students to master the corresponding skills, but also to improve the comprehensive level of students, so that children in poverty-stricken areas can receive vocational education with richer content, higher security and higher income. Vocational colleges need to continuously develop and strengthen themselves while doing the work of accurate poverty alleviation. In addition, the performance assessment mechanism is an important part of the vocational poverty alleviation, and it is very important to construct a complete accident poverty alleviation assessment system.

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2. The Significance of Implementing Accurate Poverty Alleviation in Vocational Education

2.1 Vocational Education Can Accurately Block the Intergenerational Transmission of Poverty

The purpose of vocational education is to train technical and skilled talents for the society. The use of vocational education can greatly enhance employment and serve the people's livelihood[1]. Vocational education plays an important role in accurately blocking the intergenerational transmission of poverty, mainly in the following aspects: First, vocational education bears a large part of the education of children in poor families. According to incomplete statistics, most of the students in vocational colleges come from rural families or families with financial difficulties in the city, from this point of view, it is very necessary to carry out accurate poverty alleviation in vocational education. Second, vocational education can enable students from poor families to acquire certain skills and skills, thereby promoting employment and improving family poverty to a certain extent. Third, vocational education can effectively help poor families to achieve high-quality employment. Under normal circumstances, vocational colleges often use school-enterprise cooperation, which is more secure in employment[2].

2.2 Vocational Education Can Accurately Help Poor People out of Poverty

Vocational education not only carries out academic education, but also carries out various vocational trainings for the society, helping some technicians to improve themselves, and has the role that other education cannot replace. In the vocational education, the implementation of accurate poverty alleviation can help the poor to get rid of poverty, mainly in the following aspects: First, the poor can be implanted into the "gene" of poverty alleviation. Most of the poor people lack the corresponding information on getting rich, and their ideas are relatively backward, which is also the main cause of poverty, therefore, it is possible to provide the "gene" for poverty alleviation, so that it can gradually get rid of poverty in the mind, and thus help the poor to get rid of poverty. Currently, in many institutions, there is specialized training to enhance the confidence of getting rid of poverty. Second, vocational education can help poor people master the skills to get rid of poverty. The lack of knowledge and technology of the poor, lack of skills is an important factor in poverty, and vocational skills training in vocational colleges can greatly alleviate this problem. The third is to provide corresponding guidance and training for the production and operation of poor people. According to relevant research and research, most vocational colleges have conducted technical consultation and services for the poor[3].

2.3 Vocational Education Can Accurately Help Poverty-stricken Areas out of Poverty

Vocational education plays an important role in the work of accurate poverty alleviation, which can help poverty-stricken areas to alleviate poverty to a certain extent, mainly in the following aspects: First, vocational education can provide skilled talents for poverty-stricken areas. Vocational education and local economic development are closely linked, and many skilled talents in poverty-stricken areas are mainly derived from vocational education. Second, vocational education can provide technical services for the development of poverty-stricken areas. Vocational colleges have professional faculty and technical personnel, which can provide favorable technical support for poverty alleviation in poverty-stricken areas. The third is to help poverty-stricken develop poverty alleviation projects. In poverty-stricken areas, they need to get rid of poverty as soon as possible. It is necessary to develop effective poverty alleviation projects as soon as possible, make full use of regional advantages, and develop poverty alleviation projects that promote economic development in the region.

3. The Dilemma of Accurate Poverty Alleviation in Vocational Education

3.1 The Object Recognition Accuracy of Accurate Poverty Alleviation in Vocational Education Needs to Be Improved

In the vocational education, the accurate poverty alleviation will inevitably lead to the problem of leaning the educational resources, so that poor students and their families can get more benefits in the accurate poverty alleviation. However, due to the large number of poor people in poverty-stricken areas, there are large differences between different families. Coupled with the lack of grassroots investigation work, there will be certain deviations in the identification of accurate poverty alleviation objects, and it is impossible to effectively put educational resources into the people who need the most help. Usually, most vocational colleges use written materials to judge the family's poverty. Students receive proof of poverty materials and pass the school's review, and the school subsidizes them. However, poverty alleviation offices in some areas require self-declared self-declaration, while poor people do not have a high level of understanding of the country's

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accurate poverty alleviation policy, and fail to report in time, thus causing omissions in the identification of poor people. There are also some poverty-stricken areas in poverty-stricken areas that need to be upgraded. In this case, some poor students will not be certified due to external factors.

3.2 The Accurate Poverty Alleviation Mechanism in Vocational Education Needs to Be Improved

The accurate poverty alleviation work of vocational education involves a wide range. Not only do the institutions themselves need to do a good job in accurate poverty alleviation, but also the institutions and relevant government departments need to do a good job of communication and coordination. However, from the development of accurate poverty alleviation work in Chinese vocational colleges, the accurate poverty alleviation mechanism of vocational education still needs to be improved, and the accurate poverty alleviation work of vocational education in some areas needs to be improved. In addition, vocational education and accurate poverty alleviation belong to different departments, so that colleges and universities will have greater difficulties in carrying out accurate poverty alleviation. In order to carry out accurate poverty alleviation projects, institutions need to report to the local education departments and poverty alleviation offices separately, which has caused the institutions to be less efficient in carrying out accurate poverty alleviation and it is difficult to carry out their work effectively. Moreover, due to the different degrees of economic development in different regions, the types of vocational colleges in different regions are also different. Under normal circumstances, different types of institutions belong to different government departments, which also pose certain difficulties for the development of accurate poverty alleviation work. Therefore, it is very important to improve the accurate poverty alleviation mechanism of vocational education[4].

3.3 The Measures of Accurate Poverty Alleviation in Vocational Education Needs to Be Improved

Since the 19th National Congress put forward the "accurate poverty alleviation" policy, all regions in China have gradually carried out accurate poverty alleviation work. The state has also issued a number of documents and policies, and initially formed an accurate poverty alleviation mechanism, which provides a solid theoretical basis for the development of accurate poverty alleviation work in various regions. Under this circumstance, the accurate poverty alleviation work of vocational education is also being carried out smoothly. At present, a certain mode has been formed, and vocational education has also promoted the development of poverty-stricken areas and poor people to a large extent. However, there are still certain problems in the current accurate poverty alleviation work in vocational education. There are mainly two aspects. On one hand, there is not much integration between the development of poverty alleviation work in vocational colleges and the development of regional economy, which makes it difficult to implement many specific measures to improve poverty. On the other hand, vocational education and poverty alleviation workers do not fully understand the actual situation of poverty alleviation areas, and the training content that has been developed is inconsistent with the actual situation, and it is difficult to exert the value of its application.

3.4 Vocational Education Poverty Alleviation Development Is out of Touch with the Needs of the Labor Market

Vocational education is also a form of Chinese education, and the corresponding ones will be affected by the test-oriented education. Many vocational colleges have not kept pace with the times in many aspects, which made it difficult for the talents trained to meet the actual needs of society, which has also greatly restricted the development of vocational education in China. In recent years, vocational colleges have been continuously reforming and have made certain progress. However, in some underdeveloped areas, due to lack of resources and the backwardness of teachers, the development of vocational education and social needs are out of touch. Judging from the current development of vocational education poverty alleviation work, poor market areas have not yet established a sound market feedback mechanism, which is less sensitive to the market and it is difficult to guarantee the effective employment of students. In addition, the communication between the institutions and the enterprises in the process of carrying out accurate poverty alleviation needs to be further improved, so that the employment situation of students is affected accordingly.

4. The Construction of Performance Assessment System for Accurate Poverty Alleviation in Vocational Education

4.1 The Principles for the Construction of Performance Assessment System for Accurate Poverty Alleviation in Vocational Education

As an important part of the accurate poverty alleviation work, the performance assessment system has a strong

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promotion effect on the entire accurate poverty alleviation work. In the construction of the vocational education accurate poverty alleviation performance assessment system, the following principles need to be followed.

4.1.1 The Principle of Participation

The construction of performance assessment indicator system not only needs to consider whether the college has reached the corresponding goals, but also needs to consider the main feelings of the poverty alleviation target, earnestly do a good job in poverty alleviation work, ensure the local adaptability of poverty alleviation work, and avoid the situation of poverty alleviation. As the main beneficiary of accurate poverty alleviation, the overall poverty alleviation is very important. It is necessary to focus on the feelings of poverty alleviation, focus on improving the problems raised by them, and promote the effective development of accurate poverty alleviation. It is very necessary to strengthen the exchanges and interactions between institutions and poverty alleviation objects. In the performance assessment system, the satisfaction of poverty alleviation targets should be included.

4.1.2 The Principle of Integrity

As a comprehensive project, poverty alleviation work involves more content and is related to all aspects of poverty alleviation. Therefore, when formulating the performance assessment system, there are more contents to be covered.

4.1.3 The Principle of Measurability

In the formulation of the performance assessment system, all performance assessment indicators can be expressed by specific indicators, and the corresponding data can be used for detection and statistics. When using the general performance assessment indicators, it is necessary to combine the actual situation of the region and provide corresponding data support for the accurate poverty alleviation work in the region.

4.1.4 The Principle of Systematicness

As the external environment changes, the performance assessment will also change accordingly. To this end, in the performance assessment, it is necessary to fully consider the external situation changes and adjust the performance assessment indicators accordingly.

4.2 The Methods of Constructing Performance Assessment System for Accurate Poverty Alleviation in Vocational Education

The general construction methods of the performance assessment system are the methods of cost-effective, analytic hierarchy process, comprehensive scoring, artificial neural network, etc. There are many methods for constructing the performance assessment system. Different methods have different advantages and disadvantages. When using these methods, you need to choose the most suitable construction method according to the actual situation[5]. Different scholars will adapt to different performance system construction methods in the research process, and use statistical data to give corresponding data analysis. Based on the comprehensive performance assessment methods, this paper puts forward a performance assessment indicator system including the subjects, objectives, means and environment of accurate poverty alleviation. The subject of accurate poverty alleviation is the resource problem. In terms of accurate poverty alleviation in vocational education, the subjects of accurate poverty alleviation can be schools, governments and corresponding social welfare organizations, which involve various issues such as financial input and manpower input. There is no uniform standard for the definition of poverty alleviation goals, either in terms of survival or economic.

4.3 The Application of Performance Assessment System for Accurate Poverty Alleviation in Vocational Education

The application of the performance assessment indicator system in the accurate poverty alleviation of vocational education can measure the actual effect of accurate poverty alleviation in vocational colleges to a certain extent, fully reflect the problems in the accurate poverty alleviation of vocational education, and take corresponding improvement measures to improve the accurate of vocational education and poverty alleviation.

5. Existing Problems in the Performance Assessment System for Accurate Poverty Alleviation in Vocational Education

Judging from the development of the accurate assessment system for vocational education, the theoretical research level of accurate poverty alleviation performance assessment has improved, but there are still certain problems in the performance assessment system.

5.1 The Construction of the Indicator System Needs to Be Scientific

After relevant researches, the current accurate poverty alleviation in vocational education performance assessment system gradually presents diversified development, but there are still some problems in the performance assess-

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ment system for accurate poverty alleviation in vocational education, mainly reflected in the following aspects[6]. First of all, the construction of the indicator system needs to be further improved. The purpose of accurate poverty alleviation is to improve the poverty situation in poverty-stricken areas and to get rid of poverty in time. As the main beneficiary of accurate poverty alleviation, poverty alleviation is also a direct judge of accurate poverty alleviation. However, from the current vocational education accurate poverty alleviation performance assessment system, Most of them judge the effect and situation of accurate poverty alleviation from a macro perspective, but rarely touch the subjective view and concept of poverty alleviation objects. This leads to the lack of comprehensiveness of the performance assessment system and the existence of certain one-sidedness. In addition, when constructing the performance assessment system, the participation of poverty alleviation targets is often lacking, and whether the life of the poverty alleviation objects has been effectively improved is the most direct judgment on whether the poverty alleviation work is effective. This factor needs to be added to performance assessment indicators to ensure the comprehensiveness and scientificity of the performance assessment system. Secondly, it is necessary to improve the reliability of the performance assessment system. Although the theoretical indicators are more feasible in the accurate performance assessment of vocational education, there is still certain feasibility in practical application, and the operability needs to be improved.

5.2 The Methods of Constructing Indicator System Need to Be Diversified

Although there are many methods that can be used in the construction of the indicator system, there are still some problems in practical applications, and it is necessary to improve the diversification of the construction methods. Performance assessment needs to make more scientific and accurate judgments on accurate poverty alleviation through quantitative and qualitative comparative analysis. The usual method used in the construction of current performance assessment indicators is the "input-output" comparison method. Although this method is more convenient and intuitive, there are still major difficulties in determining the input-output problem, and it is necessary to further determine the accuracy of the performance assessment. In addition, some scholars also use statistical methods to improve the assessment indicator system. However, more statistical methods can be used in the construction of the indicator system to improve the comprehensiveness and comprehensiveness of performance assessment indicators[7].

5.3 The Construction Results of the Indicator Assessment System Need to Be Further Implemented

The performance assessment indicator system is designed to better implement the accurate poverty alleviation mechanism, better promote the development of poverty-stricken areas, improve the lives of the poor, and use performance assessment mechanisms to identify problems in the accurate poverty alleviation work and take corresponding recommendations. However, it is found that the implementation of the performance assessment indicator system is insufficient in the current performance assessment indicator system. First of all, it is found from the existing research that the number of applications of the assessment indicator system is very low, but it is obviously insufficient in practical application. Moreover, the application of most assessment indicator systems is applied in local areas, and there are certain limitations. The comparability of local assessments is poor. It is difficult to effectively analyze the assessment results, and the quality of the assessment system of indicators is further improved.

6. Ways to Strengthen the Accurate Poverty Alleviation in Vocational Education

6.1 Improve the Classification and Identification Methods for Objects in Poverty

In the accurate poverty alleviation work, we must first solve the problem of accurate identification of accurate poverty alleviation objects. The key points and difficulties of accurate poverty alleviation are on accurate issues. The Party Central Committee has put forward the "six accurate" requirements for accurate poverty alleviation work. The first requirement is to ensure the accuracy of poverty alleviation objects. As an effective channel for carrying out accurate poverty alleviation work, vocational education needs to further strengthen the work of accurate poverty alleviation and improve the classification and identification methods of poverty alleviation objects. Sound accurate identification can start from the following aspects: First, it is necessary to strengthen the comprehensive and comprehensive investigation of poverty alleviation targets. In the identification work of poor people and poor families, it is necessary to break the traditional limitations, and do a good job in field investigation to ensure the authenticity of the investigation results. The grassroots departments should set up corresponding investigation and identification teams to strengthen the field investigation work. There is no personal feeling in the investigation process, and it is necessary to conduct corresponding in-

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vestigations according to the situation on the ground. Second, after understanding the actual situation of the poor students, it is necessary to further understand the causes of poverty, poverty alleviation and other aspects, and then take corresponding measures. On the basis of government identification, vocational colleges should further improve the identification methods of poor students and provide an effective way for students who need to improve their poverty alleviation[8].

6.2 Perfect the System Construction of Accurate Poverty Alleviation in Vocational Education

Vocational education has achieved certain results in the work of accurate poverty alleviation. However, it is still necessary to further improve the system of accurate education for poverty alleviation in vocational education, and provide a better external environment for the development of accurate education for vocational education.

The improvement of the system is more utilized to carry out accurate poverty alleviation work. At this stage, it is very important to improve the system of accurate education for poverty alleviation in vocational education. Colleges and universities need to establish sound and accurate poverty alleviation mechanisms and norms. Accurate poverty alleviation is a comprehensive and comprehensive project. It involves more content and is often complicated. It involves not only the skills education of students, but also the relationship between various social stakeholders. To improve the accurate education of vocational education, we need to start from the following two aspects. First, the state should strengthen the construction of laws and regulations on accurate poverty alleviation in vocational education, make up for the lack of law in accurate poverty alleviation, and focus on the positioning of vocational education in accurate poverty alleviation. Clarify the rights and obligations of vocational education in the precise poverty alleviation. Second, it is necessary to strengthen the guidance to local governments, assist local governments to establish a precise poverty alleviation mechanism for vocational education, and take the initiative to undertake their precise poverty alleviation work[9].

6.3 Improve Vocational Educational and Training Systems in Poverty-stricken Areas

Most of the poverty-stricken areas have similar characteristics. The economic development level of these areas is relatively backward, and the educational mechanism needs to be improved. Although the education system in some areas has a certain level of hierarchy, it is subject to external factors, and there is still room for improvement in the quality of teaching. The ability to serve the society is also greatly limited. To carry out accurate poverty alleviation work in vocational education, it is necessary to establish a sound vocational education and training system to further enhance the skill level of vocational education. Through a multi-level, three-dimensional education system, it can improve the education level of vocational colleges to a certain extent. When building a vocational education and training system in poverty-stricken areas. Firstly, we must ensure that there is consensus and agreement between the institutions and local governments, and we all agree with the development of vocational education and training. Secondly, in view of the actual situation of the educated, targeted teaching should be carried out to improve the skill level of the learners. Thirdly, the local government should also play its full role, do a good job of optimizing the allocation of resources, and combine the educational resources of the institutions with the social education to improve the skills of students. Finally, local governments also need to strengthen the promotion and promotion of accurate education in poverty alleviation in vocational education, so that more people can realize the significance and importance of accurate poverty alleviation.

6.4 Strengthen the Link between Vocational Education and the Market

The key to carrying out accurate poverty alleviation in vocational education is that vocational education is mainly to train skilled talents, which can greatly promote the employment of students, therefore, in the process of carrying out accurate poverty alleviation, vocational education needs to strengthen the connection between vocational education and the market, so that the institutions are more sensitive to the employment direction, and thus increase the employment rate of the school. In the process of carrying out accurate poverty alleviation, schools should focus on the changes in the market, keep abreast of market dynamics, and do appropriate education and training[10].

7. Conclusion

The 19th National Congress of the Communist Party of China put forward that poverty alleviation is the key task of China's current poverty alleviation. It is very necessary to carry out accurate poverty alleviation in vocational education. The development of accurate poverty alleviation can effectively improve the problem. As an important basis for measuring accurate poverty alleviation, performance assessment mechanism is also very important to build a perfect performance assessment mechanism.

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The Influence of Internet Economy on High School Students' Consumption Concept

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ABSTRACT

With the rapid development of Internet technology, the Internet economy has gradually penetrated into every aspect of people's life. The group of high school students has increasingly become an important part of the Internet consumption market, and its consumption concept is also deeply influenced by the Internet economy. Based on the analysis of the development status of the Internet economy and the characteristics of high school students' consumption concepts, this article analyzes the double impact of the Internet economy on high school students' consumption concepts. On this basis, it expounds how to guide high school students to form the correct consumption concepts under the Internet economy from the three dimensions of school, family and individual.

1. Introduction

"Internet plus" has been mentioned in China's government work report every year since 2015. In the government work report in 2019, premier Li Keqiang even proposed to "comprehensively promote 'Internet plus' and transform traditional industries with new technologies and new models", indicating the importance the country attaches to the development of the Internet. With the emergence of the Internet, Internet economic activities are gradually infiltrating into various fields of social life, and are deeply loved by high school students who are extremely concerned about the Internet and pursuing fashion trends. High school students are in a critical period of the formation of world outlook, outlook on life and values, and their consumption concepts are easily influenced by the subtle influence of the Internet economy. Therefore, based on the current situation of Internet development and the characteristics of high school students' consumption concepts, this paper reveals the advantages and disadvantages of the Internet economy, which is of great significance to guide high school students to form a correct consumption concept.

2. Analysis of the Current Situation of Internet Economy and High School Students' Consumption Concept

The Internet economy has developed rapidly in recent years, and the consumption of high school students is increasingly dependent on the Internet economy. However, the consumption of high school students still has some characteristics such as immature mind, susceptible psychology and misleading ideas. The analysis of the development status of Internet economy and the characteristics of high school students' consumption concept can lay a realistic foundation for a bet-

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ter understanding of the impact of Internet economy on high school students' consumption concept.

2.1 The Development Status of the Internet Economy

Internet economy is the sum of all economic activities based on the Internet, and it is a new economic phenomenon when information technology and network technology have developed to a certain stage.

In today's era, it mainly includes five types: e-commerce, online finance, instant messaging, search engines and online games. The rapid development of the Internet economy has greatly improved the efficiency of people's processing and utilization of information, and promoted the Internet economy to penetrate into all walks of life and constantly transform into new productive forces, thus driving the continuous development of the economy.

Since the 1990s, with the wide application and vigorous development of Internet technology, human society has entered a new era. According to the latest survey data from the China Internet network information center, by March 2020, China's Internet users totaled 904 million and the Internet penetration rate reached 64.5%, an increase of 4.9 percentage points over the end of last year. Among them, the number of middle school students is the largest, accounting for 19.3%. High school students and those with the same education background account for 22.2% of the total number of Internet users, ranking the second. The huge number of Internet users among high school students is an important part of China's booming consumer market and has laid a solid user base for the development of the Internet economy.

2.2 The Characteristics of High School Students' Consumption Concept

First of all, high school students are not mature enough in consumption. High school is an important period for the formation of people's world outlook, outlook on life and values. It is also a key stage for the development of high school students' personality and sociality. In this period, the income of high school students mainly comes from their families, and the consumption level is subject to the income level of the families and the high level of different family environments

In middle school students, their consumption concept will also be different. Although high school students have initially formed some consumption knowledge, consumption habits and consumption attitudes through their families, schools and peer groups, their consumption mentality is still relatively immature and in urgent need of maturity due to their lack of experience and incomplete understanding of consumption.

Secondly, high school students' consumption psychology is easily affected. High school students usually spend most of their time at home and school. They have little contact with the outside world and only one contact group. They have limited time, energy and channels to obtain other information. However, the stage of high school students is also the stage of the vigorous development of the psychology of curiosity, and the consumer psychology is easily affected by subjective and objective factors, resulting in the psychological consumption of following the trend of the crowd, the psychological consumption of seeking differences in pursuit of distinctive, and the psychological consumption of keeping up with the comparison of advertising brands.

Finally, high school students' consumption concept is easily misled. Because high school students' mind is not mature enough and their psychology is easy to change, it is easy for them to lose themselves in the face of complicated things and dazzling commodities. Under the tide of Internet economy, it is difficult for high school students to distinguish the consumption concepts and values advocated by the Internet from the things hidden behind various ideas, and they are easy to be misled and go astray. Not only that, high school students who lack the correct guidance from their school and family on the concept of consumption are more likely to make the concept of consumption into the erroneous thinking, which leads to the wrong consumption behavior.

3. The Internet Economy on High School Students' Consumption Concept of the Double Impact

The Internet economy is a double-edged sword for high school students. From a favorable point of view, the Internet economy provides high school students with a more convenient consumption process, more diversified consumption methods and a better way to meet their own consumption needs. From an unfavorable point of view, the Internet economy tends to blur the moral boundary of high school students, to waste their consumption, and to compare their consumption psychology.

3.1 The Positive Impact of Internet Economy on High School Students' Consumption Concept

First, the consumption process is more convenient. With the rapid development of the Internet economy, mobile payment has become more perfect, making the entire consumption process of high school students fast, convenient, safe and efficient. Compared with the past, with the popularization of QR code scanning payment methods such as WeChat and Al-

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ipay and the assistance of supporting Internet financial products, more and more high school students have moved from traditional cash payment to cashless life. From the generation of consumption needs to the end of the consumption process, the time of the whole process is greatly shortened and the efficiency is greatly improved, so high school students can have more time to devote to their study.

Second, consumption patterns are more diverse. When the Internet economy has not been so popular, the consumption capacity of high school students is limited and the consumption mode is a little monotonous, which is mainly used to meet their own basic needs. However, with the development of the Internet economy, the consumption pattern of high school students tends to be diversified. High school students can not only buy online to meet their needs for food, clothing, housing and transportation, but also choose to consume online games, online literature, online music, online videos, live streaming, take-out, social applications and online education.

Third, consumer demand will be better met. On the one hand, the group of high school students has no income, and their income mainly comes from their parents, so their consumption level is subject to their pocket money. On the other hand, the stage of high school is the stage of rapid growth of consumer demand, if you want to completely meet their own consumer demand is very difficult to do. The emergence of the Internet economy has solved this problem to a certain extent. A wide variety of commodities, exciting advertising, accurate big data push, high-quality personalized services and affordable prices have made the high school students unable to stop and their consumer demand has been better satisfied.

3.2 The Negative Impact of Internet Economy on High School Students' Consumption Concept

First, consumption tends to be wasteful. Faced with various consumer goods and featured services emerging on the Internet, it is difficult for high school students with weak self-control to control their consumption desire. Coupled with the exciting advertising and discount marketing strategy, the high school students' consumer demand is growing, consuming many unnecessary products and services. However, due to the influence of income level, many high school students begin to use such Internet financial products as hua bai and borrowing bai for overdraft consumption, resulting in a sharp increase in economic pressure on students and their families. Failure to repay the loan as scheduled will also affect students' future credit.

Second, consumer psychology tends to keep up with the joneses. In the traditional offline consumption mode, the consumption channels and scope of high school students are limited, while the development of Internet economy and express delivery industry has broken the time and space limit of consumption. Students with good family conditions and more pocket money will learn to consume some new things, which will soon become popular in their own small circle. Under the influence of peer pressure, they will cause the appearance of the psychology of keeping up with the joneses. Some students are influenced by the psychology of keeping up with the joneses, and some unhealthy phenomena will appear, such as food consumption looking at advertisements, clothing consumption looking at famous brands, entertainment consumption looking at popularity, and human consumption looking at adults.

Third, moral boundaries tend to blur. Internet economy not only exerts a subtle influence on high school students' outlook on money and consumption, but also exerts a great influence on their values and morals. On the one hand, the Internet economy is market-oriented and the pursuit of economic benefits is the goal, which will bring a lot of potential risks and negative information to the high school students, such as network violence, information leakage, network fraud, blindly chasing stars, live broadcast rewards, and game recharge and so on. On the other hand, the self-identification ability of high school students is still in the development stage, and the moral boundary will become more ambiguous, which will lead to the so-called "moral crisis", which is not conducive to the healthy and comprehensive development of high school students.

4. Under the Internet Economy High School Students' Consumption Idea Guidance Suggestion

While the Internet economy brings great convenience to people, it also highlights various risks and challenges. How to make use of the advantages and avoid the disadvantages, how to correctly guide the high school students' consumption concept needs the school and family to work together, and more importantly, high school students need to set up the correct, rational, green and economical consumption concept.

4.1 School: Theoretical Education, Practical Experience

School is not only a treasure house for high school students to learn scientific and cultural knowledge, but also a cradle for high school students to develop their world outlook, outlook on life and values. Teachers are also engineers of human soul, playing an irreplaceable role in correctly guiding high school students' consumption

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concepts. First of all, schools can rely on the ideological and political courses to ask ideological and political teachers to better teach knowledge about consumption and strengthen the guidance of theoretical education. Secondly, the school can hold a series of lectures such as preventing network addiction and network fraud, and subtly guide high school students' consumption concept by making propaganda boards and putting up propaganda slogans. Moreover, each grade and each class can use their spare time to organize and carry out some online charity sales and offline volunteer service activities, so that students can realize the advantages and disadvantages of the Internet economy and the hard-won money in practice, and achieve the combination of theory and practice.

4.2 Family: Lead By Example and Strictly Control

Family is the haven of high school students, but also the material security of high school students' consumption; Parents are the best teachers of children, but also the guide to the formation of children's consumption concept. Children are a mirror of their parents. The consumption concept of high school students also reflects the consumption concept that parents have been holding in the growth of students to some extent. Therefore, parents should first of all lead by example with their own practical actions to practice the correct concept of consumption, high school students will consciously or unconsciously imitate their parents' way of consumption after osmosis. Secondly, high school students are already teenagers with certain cultural knowledge. Parents can speak in their spare time about the hardships and fatigue of acquiring money, teach some Internet financial management knowledge and its risks, and let students fully realize the risks of consumption on the Internet. Finally, when parents find that high school students have extravagant and wasteful consumption behaviors, such as seeking differences and keeping up with the joneses, they should, on the one hand, strengthen their persuasion and education and understand the reasons based on their emotions. On the other hand, the frequency of surfing the Internet and the amount of pocket money beyond basic needs should be strictly controlled, and the normal study and life should not be affected due to the addiction to Internet consumption.

4.3 Students: Moderate Rationality, Green Economy

The blacksmith also needs to own hard, under the background of the Internet economy to establish the correct concept of consumption in the final analysis or to rely on high school students themselves. First of all, high school students should moderate consumption, on the one hand, to their own economic capacity to bear the scope of consumption, never to meet their own vanity and excessive consumption of psychological comparison, more cannot be hidden from parents and teachers desperate to use the online loan platform overdraft consumption; On the other hand, we cannot lag behind the consumption, in order to save money and tighten our belts, so that our basic living needs cannot be met. Secondly, high school students should be rational consumers. They should be clear about what types of goods and services they need. They should not blindly follow the trend or follow the crowd. In addition, emotional consumption should be avoided. In the face of the sugar-coated shells of network anchors and online games, we should maintain composure and be a calm consumer. But also to coordinate the balance between material consumption and spiritual consumption, more use of the Internet online learning convenience, use its massive resources to meet their own spiritual needs, do elegant consumers. Third, high school students to green consumption, on the one hand, in the purchase of goods to pay attention to screening, to the fake and shoddy products to resolutely protect their rights in a timely report, practice the principle of green consumption at the source; On the other hand, for durable goods to reuse, multiple use, to avoid the only temporary novelty impulse consumption. Not only that, when throwing away the used consumer goods, we should pay attention to the garbage classification, to avoid environmental pollution, such as recyclable clothing can be donated to the poor areas for recycling. Finally, high school students should economize on consumption, carry forward the traditional Chinese virtues, take pride in hard work, and take pride in luxury and luxury as a shame[1-4].When online consumption meets your own needs, learn how to manage and rationally use your pocket money, and develop the consumption concept of diligence and frugality. Always remember that parents make money is not easy, always with gratitude, in the life of thrift, hard work in learning, with a better future return parents.

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Overview of the Relationship between Internal Control and Corporate Governance

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ABSTRACT

As the global economic crisis deepens, people have a clearer understanding of risks. Since internal control and corporate governance can better control risks in the development of a company, how to properly handle the relationship between internal control and corporate governance has become the focus of research. There are mainly three views on the relationship between the two among scholars' researches including environmental theory, basic theory and chimerism theory. In the normal operation of a company, as internal control and corporate governance are closely related, people are more inclined to the point of view of chimerism, claiming that the two affect each other and they are inseparable.

1. Introduction

Since Jenson and Meckling created the principal-agent theory, due to the "agent cost" that would result in a decline in corporate value, a corporate governance mechanism is expected to be created to reduce agency costs. Meanwhile, from the perspective of management, the ultimate goal of corporate governance and internal control is to realize corporate strategic goals [1]. Therefore, it is particularly important to correctly handle the relationship between internal control and corporate governance. At present, the relationship between the two is mainly demonstrated as environmental theory, chimerism theory and basic theory. Among them, the environment theory believes that, as the environmental element of internal control, corporate governance must be efficient in order to make the effectiveness of internal control better. Corporate governance is an institutional environment, while internal control is an internal management and monitoring system under the corporate governance system. At the same time, corporate governance affects the quality of internal control [2]. However, the chimerism theory advocates that internal control and corporate governance are mutually contained and influenced, underlining the endogenous nature of the two. It believes that internal control and corporate governance as two elements within the same system can influence each other and have an inherent structure. In addition, the basic theory believes that the effective operation of corporate governance is inseparable from the basic role of internal control [3]. Similarly, the study of internal control is also inseparable from the corporate governance environment.

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To achieve the goals of internal control, corporate governance and internal control must have a good connection and an interactive combination [4]. Although many scholars have studied the relationship between internal control and corporate governance, and have drawn corresponding research conclusions, it spreads a thousand flowers bloom. There are many different opinions and they have not been unified. Therefore, this article first analyzes the concepts of internal control and corporate governance, and then summarizes and reviews existing views to further study the relationship between internal control and corporate governance to promote the company's development more healthily and effectively.

2. Concept Definition

2.1 The Concept of Internal Control

Internal control is a series of restraint, planning and evaluation measures implemented by the company. These measures are used to ensure the authenticity of the disclosed information and to ensure the company's operating effect and profit. With the development of internal control, its content, focus, methods and technical means have been gradually improved. At present, internal control has entered the stage of overall risk management framework. Many scholars put forward the overall framework of enterprise risk management on the basis of the overall framework of internal control. They believe that the risk management of an enterprise should be jointly participated by the board of directors, managers and employees. It covers the entire process from corporate strategy formulation to the execution of various departments and employees.

2.2 The Concept of Corporate Governance

Corporate governance in a broad sense not only revolves around the protection of shareholders' interests, but also includes the relationship between the company and other stakeholders, ensuring the company's scientific decision-making, and safeguarding the company's interests. The narrow sense of corporate governance is the corporate governance structure, which clearly divides the rights, obligations and responsibilities between the general meeting of shareholders, the board of directors, the board of supervisors and the managers. The characteristics of corporate governance are divided into internal governance features and external governance features. The characteristics of internal governance include the characteristics shown by internal regulatory agencies such as shareholding structure, the board of directors, the board of supervisors, management, and audit committee. And the characteristics of external governance refer to the supervision and management of external stakeholders related to the company.

3. The Competition of Ideas

Corporate governance and internal control are homologous, and the basis for their generation is principal-agent. However, corporate governance is based on solving the agency problem between owners and managers, and internal control is trying to solve the agency problem of agents at different levels. It is an extension of corporate governance contracts within the enterprise. The relationship between the two has been a hotly debated topic in academia.

3.1 Environmental Theory: Corporate Governance as an Environmental Element of Internal Control

With the improvement of the legal system of internal control, internal control has expanded from serving the initial audit to serving the entire corporate governance. Relevant scholars have also focused their attention on the study of internal control and corporate governance. The environmental theory can be elaborated from the following two aspects.

3.1.1 The Impact of the Macro Level of Corporate Governance on Internal Control

Foreign scholars Udi and Rani pointed out SOX-404 and SOX-302 in 2009, pointing out that corporate governance efficiency is positively correlated with the effectiveness of internal control, and the improvement of corporate governance efficiency can affect the effectiveness of internal control. Therefore, good corporate governance can determine whether internal control is effective or not. In addition, corporate governance is a prerequisite for internal control, and it has a direct relationship with the operating effect and quality of internal control. Therefore, corporate governance can improve the quality of internal control of companies [5]. Focusing on the development of corporate governance and the improvement of structure can also promote the development of internal control. At the same time, it is not enough to overcome the limitations of the internal control system by relying solely on the improvement of the system itself, but also on the perfect fit between internal control and corporate governance on the basis of homology. Therefore, an effective way to improve internal control is to establish and improve the corporate governance.

3.1.2 The Impact of Micro-Level Corporate Governance on Internal Control

The internal and external characteristics of corporate gov-

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ernance have an important impact on the internal control of the company. For example, due to their independence, independent directors can help to exercise their supervisory functions, thereby improving the effectiveness of internal control. The concentration of equity will affect the rights of small and medium investors to a certain extent. In addition, elements of corporate governance such as corporate governance structure, board characteristics, and manager compensation also have an impact on internal control.

Many domestic scholars have also conducted a systematic study on the impact of corporate governance characteristics on internal control. Among them, the characteristics of the board of directors, equity structure (Zhao Jianfeng, 2013), the allocation of senior management rights (Liu Qiliang and Luo Le, etc., 2013), the audit committee and the CEO (Teng Weiru, 2017), etc. all have an impact on the effectiveness of internal control. The specific impact is shown in the following aspects: Li Jianhong pointed out in the article "A Research on Correlation between Corporate Governance Characteristics and Disclosure of Internal Control Defects" that the independence of the audit committee and the shareholding ratio of members of the supervisory board are significantly negatively related to internal control defects [6]. Even after the internal control defects are exposed, corporate governance has a significant impact on the repair of internal control defects. However, from the perspective of corporate governance, the relationship between the nature of the company's property rights and internal control is mutually influential, but the effect will vary among companies with different property rights [7].

3.2 Basic Theory: Internal Control as the Basis for Corporate Governance

British scholars believe that internal control is an integral part of corporate governance. The Cadbury report first included internal control in corporate governance in 1992 and believed that effective internal control can enhance the effectiveness of corporate governance. Especially after Provision 404 of the SOX Act was put forward, stakeholders pointed out that the establishment and disclosure of internal control of the company will have an important impact on corporate governance. In 2011, Ye Chengang pointed out in the article "A Research on Internal Control Mechanism from the Perspective of Corporate Governance" that "internal control is the cost of specializing branches and the execution mechanism for achieving corporate governance objectives. The operation and results of corporate internal control are subject to corporate governance. At the same time, the management of the company must abide by the internal control system, and on the basis of legal compliance, establish and improve the internal control innovation mechanism according to the company's distinctive features[8].

3.3 Chimerism Theory: Internal Control and Corporate Governance Containing Each Other

Goh discovered that corporate governance and internal control are mutually restrictive and influential through the disclosure of internal control information in 2007. In 2008, Stephen pointed out that internal control has a good role in promoting corporate governance. At the same time, domestic scholars believe that internal control and corporate governance are mutually integrated but not completely included. They are both different but connected. They complement each other, affect each other. They are inseparable, and are an organic and unified whole. However, to overcome the limitations of the internal control system, in addition to improving the internal control, it is also necessary to build good corporate governance so that the two can jointly promote the company's sustainable development. Moreover, an effective corporate governance mechanism can ensure the consistency of control objectives at different levels. In addition, the effectiveness of internal control is positively related to the company's governance efficiency, and the most fundamental purpose of both is to control the risks of the enterprise. In terms of the connection between the two, internal governance in corporate governance is included in internal control and is the top-level design of internal control, while management control in internal control is an extension and concretization of the strategic level of corporate governance [9]. A high level of corporate governance can improve the quality of internal control, and a high-quality internal control can also improve the level of corporate governance, and the impact of internal control quality on corporate governance is greater than the impact of corporate governance on internal control quality [10].

4. Conclusion

To summarize, the relationship between internal control and corporate governance in academia has not yet been finalized. Internal control and corporate governance are the necessary conditions for the healthy operation of an enterprise, both of which are used to control the risks of the enterprise. The relationship between the two ultimately comes from the complexity of the company's business activities and governance structure. This paper advocates an extension based on the chimerism theory and believes that corporate governance lays the foundation for the effective

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implementation of internal control. At the same time, the good operation of internal control can also ensure the improvement of corporate governance. If analyzed from a broad perspective, the corporate governance system permeates the internal control thinking, which fully reflects the basic requirements of the company's internal control. Therefore, corporate governance and internal control are inseparable. From the perspective of enterprise management, corporate governance covers internal control, which can be understood as the scope of corporate governance. Therefore, to correctly handle the relationship between internal control and corporate governance is critical to the healthy development of an enterprise.

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Impact of Sino-US Trade Agreement on Chinese Legal System about Intellectual Property Rights

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ABSTRACT

On January 15, 2020, the representatives of Sino-US trade signed Phase I *Economic and Trade Agreement Between the Government* of the *People's Republic of China and the Government of the United States of America* in Washington, which symbolizes the temporary settlement of two-year Sino-US trade war in relatively peaceful method and lays a good foundation in mutual trust for subsequent Phase II negotiation. This Agreement includes eight chapters involving Sino-US economic and trade and is called the model of the international bilateral agreement by virtue of its wide field and rigorous details. The impact of clauses about intellectual property rights on China's current legal system and the future revision direction of China's relevant laws for conformance with the Agreement will be discussed emphatically so that the author can rapidly understand the impact and significance of Sino-US trade agreement to Chinese law.

1. Introduction

Economic and Trade Agreement Between the Government of the People's Republic of China and the Government of the United States of America (hereinafter referred to as Agreement) as the result of the first negotiation of Sino-US trade war focuses on the following fields: intellectual property rights, trade of agricultural products, financial market opening, etc., in which both China and America haggle over details of the surprising rich contents. The impact and challenge of the clauses of this Agreement to China's current legal system are discussed by starting from specific contents in the intellectual property rights field, without unnecessary details to the causes and background about the Sino-US trade war.

Since the dispute in the intellectual property rights field is always one of Sino-US trade dispute cores, the government of China constantly reinforces the crackdown of its misappropriation act. Besides, the Sino-US trade agreement starts from the intellectual property rights to show its importance. The Parties specify the trade secrets protection, drug registration and patent protection term extension, copyright misappropriation of E-commerce platform, geographical indication, judicial proceedings and enforcement of intellectual property rights, etc. in details, with analyzed and interpreted as follows.

2. Expansion of Trade Secret Misappropriation, Punishment Object in Agreement and Misappropriation Form

In Article 1.3 (2) hereof, "China shall define 'operators' in trade secret misappropriation to include all natural persons, groups of persons, and legal persons." [1], while in Article 2 of *Law of the People's Republic of China on Anti-Unfair Competition*, "'A business operator' mentioned

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in this Law refers to a natural person or legal person or unincorporated organization engaged in commodities marketing or profit-making services ("commodities" used hereinafter includes such services)." The infringers in trade secret misappropriation include all natural persons, legal persons, and unincorporated organizations, instead of being confined to the particular entity engaged in economic activities and services.

In addition to that, Article 9 of *Law of the People's Republic of China on Anti-Unfair Competition* clearly states the form of trade secret misappropriation. In contrast, Article 1.4 hereof shows The Parties shall enumerate three additional acts constituting trade secret misappropriation, especially the electronic intrusions, breach or inducement of a breach of confidential obligation, and unauthorized disclosure or use of the Party in charge of protecting trade secret. Both of them indicate the above three kinds of methods still exist in the trade secret misappropriation field widely. Hence, the government of China shall also focus on the trade secret misappropriations even after extraordinary effort in the crackdown of them.

3. Explanation of Expanded Protection Scope of Trade Secrets

In Article 9 of Law of the People's Republic of China on Anti-Unfair Competition, "the 'trade secrets' as mentioned in this Law refer to any technology information or business operation information which is unknown to the public, can bring about economic benefits to the right holder, have practical utility and about which the right holder has adopted secret-keeping measures" [2], while this Agreement specifies expansion of protection scope, including both traditional trade secret and confidential business information and shows that "The Parties agree that the term 'confidential business information' concerns or relates to the trade secrets, processes, operations, style of works, or apparatus, or to the production, business transactions, or logistics, customer information, inventories, or amount or source of any income, profits, losses, or expenditures of any natural or legal person, or other information of commercial value, the disclosure of which is likely to have the effect of causing substantial harm to the competitive position of such person from which the information was obtained."

The above definitions show the trade secrets belong to, and even a small part of confidential business information, with nonequivalence relation. Undoubtedly, the protection scope of trade secrets is significantly expanded after this Agreement was signed. China's current legal system will face enormous challenges if trade secrets are protected based on the definition of confidential business information. Not only would massive judicial resources be invested, but also, more importantly, excessive protection will severely impede business innovation and progress. Since confidential business information only occurs in annotation and Article 1.9 other than other parts which only mention trade secret, it is to be further discussed that confidential business information is only protected in specific fields. Chinese Law Circle shall focus on concerning the relationship between trade secrets and confidential business information herein and the confirmation of the scope of implementation of confidential business information legislation.

4. Reversion of Burden of Proof in Civil Procedure Case about Trade Secrets Misappropriation

In Article 1.5 (1) herein, "The Parties shall provide that the burden of production of evidence or burden of proof, as appropriate, shifts to the accused party in a civil judicial proceeding for trade secret misappropriation where the holder of a trade secret has produced prima facie evidence, including circumstantial evidence, of a reasonable indication of trade secret misappropriation by the accused party", and Article 1.5 (2) specifies the specific circumstantial evidence provided by China. Simply speaking, plaintiff, without enough direct proof in the verification of defendant's misappropriation act, can still file a lawsuit to court by virtue of the relevant circumstantial evidence showing the defendant may infringe trade secrets, and the defendant shall present evidence to verify the nonperformance of trade secrets misappropriation or the invalidation of plaintiff's trade secrets. In China, the general rule of burden of proof specifies who proposes shall present evidence, and the reversion of the burden of proof shall be expressly stipulated in laws [3]. The change of the burden of proof herein directly reduces the litigation threshold of civil procedure about trade secrets misappropriation. So China's civil procedure law system shall be adjusted accordingly as per the above contents hereof in the future legislation, and shall further interpret and stipulate the specific contents and scope of application about "circumstantial evidence" in details.

5. Provisional Measures Increased for Protection of Trade Secrets

In Article 1.6 (2) herein, "China shall identify the use or attempted use of claimed trade secret information as an 'urgent situation' that provides its judicial authorities the authority to order the grant of a preliminary injunction

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based on the specific facts and circumstances of a case." Although *The Civil Procedure Law of the People's Republic of China* and relevant judicial interpretation clearly specify the "pre-litigation act injunction " and "in-litigation act injunction" earlier, local courts still give an excessively conservative verdict in the actual execution of pre-litigation act injunction due to its more abstraction than property preservation, non-directly measurable economic losses, etc. The pre-litigation act injunction is deemed as the most urgent and most essential relief means for the right holder in trade secrets case for the right holder's trade secrets couldn't be protected effectively under the invalid system. Besides, in allusion to the sharp reduction of procedure cost due to change of the burden of proof as mentioned above, a set of perfect quantitative consideration mechanisms with strong operability shall be established for the pre-litigation act injunction to avoid right holder from abusing litigation rights to attack competitors. To sum up, such clauses are of decisive significance in promoting the perfection of the pre-litigation act injunction system from a certain perspective in China's civil procedure.

6. Significant Changes in Crime Standard of Loss Calculation Method of Trade Secrets Criminal Case

In Article 1.7 (1) herein, "The Parties shall eliminate any requirement that the holder of a trade secret establishes actual losses as a prerequisite to the initiation of a criminal investigation for misappropriation of a trade secret." And China, as an interim step, shall identify the "heavy loss" in existing provisions shall contain remedial measure costs, such as the cost for enterprise operation and planning or maintenance of computer or other systems' safety. Besides, Article (1.8) hereof requires China to encompass cases of trade secret misappropriation through theft, fraud, physical or electronic intrusion for an unlawful purpose, and the unauthorized or improper use of a computer system in the scope of a prohibited act. All of them generate a significant impact on China's criminal law and criminal justice.

Firstly, in Article 219 of *Criminal Law of the People's Republic of China*, whoever commits any of the following acts of infringing on business secrets and thus causes heavy losses to the right holder shall be sentenced to fixed-term imprisonment of not more than three years or criminal detention and shall also, or shall only, be fined; if the consequences are especially serious, he shall be sentenced to fixed-term imprisonment of not less than three years but not more than seven years and shall also be fined: [4], and in China's relevant judicial interpretation, trade secrets right holder generates heavy loss if loss amount reaches over RMB 0.5 million. [5] So the crime standard of trade secret misappropriation is based on the heavy losses incurred to trade secrets right holder with the loss amount of over RMB 0.5 million under the existing Chinese law. In other words, if the doer only obtains the right holder's trade secrets in improper means without disclosure, usage, or allowing others' usage, his act can't cause heavy losses to the right holder and doesn't constitute a crime. However, the Sino-US trade agreement changes that rule, which indicates that trade secret oblige, without any actual loss, can still require initiating criminal investigation procedure in the future trade secret misappropriation crime.

Secondly, Article 219 of Chinese criminal law shows that three kinds of trade secrets misappropriation methods require the infringer to obtain others' trade secrets or disclose, use or allow others to use the right holder's trade secrets, reflecting infringer fully "controls" right holder's trade secrets. However, Article 1.8 hereof stipulates that the criminal procedures and penalties shall be initiated for the trade secrets misappropriation as long as doer's act infringes trade secrets, even if the doer doesn't obtain others' trade secrets, doesn't disclose, use or allow others to use trade secrets. So, trade secrets are significantly protected in this Agreement, and the trade secrets misappropriation act can constitute the cause of initiating criminal procedures and penalties regardless of disclosure, use or allowance of others' usage. The pure obtaining of trade secrets also constitutes the trade secrets misappropriation in accordance with the Sino-US trade agreement, which contradicts with mainstream opinion in Chinese academic circles[6].

Finally, two factors: the loss incurred to the right holder due to the misappropriation act and the benefit obtained by the right holder due to the misappropriation act shall be considered to identify the right holder's loss in current China's criminal justice practices. But in Article 1.7 (2) hereof agrees that the "heavy losses" can be fully shown by remedial costs. Hence, the calculation method of "heavy losses" of trade secrets misappropriation crime can be identified based on the remedial costs of trade secrets right holder, including the cost paid to reduce the damage to commercial operation or plan, the cost generated in guaranteeing computer or other systems' safety again, etc. And the operational and maintenance cost paid by the trade secrets right holder to remedy the misappropriation of trade secrets can be deemed as the calculation basis of "heavy loss", significantly reducing the burden of proof of trade secrets oblige.

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7. Stricter Penalty for Infringement of Intellectual Property

The infringement crimes of intellectual property in Article 213-219 of *Criminal Law* include the crime of counterfeiting the registered trademarks, the crime of selling commodities bearing counterfeit registered trademarks, the crime of illegally manufacturing or selling illegally-manufactured registered trademark mark, the crime of counterfeiting paten, the crime of infringing copyright, the crime of selling pirated goods and crime of trade secret infringement, and their terms of imprisonment are generally not high, in which the crime of infringing copyright and crime of selling pirated goods and crime of trade secret infringement can only be sentenced to fixed-term imprisonment of not more than three years at most, and other crimes shall be sentenced to fixed-term imprisonment of not more than seven years at most. While in Article 1.27 (2) hereof, "China shall: (a) as an interim step, deter future intellectual property theft or infringements and strengthen the application of existing remedies and penalties by imposing a heavier punishment at or near the statutory maximum permitted under its laws related to intellectual property to deter intellectual property theft or infringements; and (b) as a subsequent step, increase the range of minimum and maximum pre-established damages, sentences of imprisonment, and monetary fines to deter future intellectual property theft or infringements." In other words, China shall improve damages for intellectual property infringement act, sentences of imprisonment, and punishment of fines of intellectual property in the future as per the Sino-US trade agreement, while China shall, as an interim step, impose a heavier punishment at or near the statutory maximum permitted for infringement behavior of an intellectual property. As a result, China's legal protection in intellectual property can be promoted to an unprecedented level.

8. Extension to Pharmaceutical Registration and Patent Protection Duration

China shall permit pharmaceutical patent applicants to rely on supplemental data to satisfy relevant requirements for patent application during the patent examination proceedings, patent review proceedings, and judicial proceedings. The applicants submitting primary materials to China can exercise the right of defense after applying for a pharmaceutical patent to China. If the applicants submitting original materials find drugs approved and listed in China or other countries, China shall notify the obliges or licensees that others are applying for patents so that the licensees can seek for the relief measures before accused of the product listing. China, at the request of the patent owner, shall extend the term of a patent to compensate for unreasonable delays occurring in granting the patent. Currently, the maximum term period for a patent right protected by China's patent law reaches 20 years [7], which is bounded to be prolonged after signing of this Agreement due to China's compromise. Hence, the government of China will keep a delicate balance between patent protection and innovation development.

9. Protection of Geographical Indications

Geographical indications are separately enumerated in Section 6 of the intellectual property part to show American attention to it. Undoubtedly, the United States is far earlier than China in terms of protection of geographical indications and promulgated the convenient and effective protection mode in the *Lanham Act*. Besides, international society started protecting geographical indications over one hundred years ago, including the later *Agreement on Trade-Related Aspects of Intellectual Property Rights* (TRIPS) approved by World Trade Organization, then various countries in the world reach the consensus to geographical indications for protection of intellectual property; while, China still continuously improves the geographical indications system at present. Then this Agreement specifies both America and China shall keep geographical indications completely transparent and procedure fair. So we can judge the United States, based on its mature protection mode, aims to require China to offer equal protection.

In recent years, China has made rapid progress in the protection of geographical indications. Concerning transparency, National Intellectual Property Administration promulgated the announcement about the protection of geographical indications products for the first time on August 8, 2018, to gradually disclose protected information; concerning management subject, National Intellectual Property Administration replaces General Administration of Quality Supervision, Inspection, and Quarantine to uniformly manage national protection of geographical indications products; with regard to legal provisions, the *Measures for the Protection of Foreign Geographical Indication Products* promulgated by AQSIQ in 2016 was revised by National Intellectual Property Administration in No. 338 Announcement, which further perfects the procedural protection of foreign geographical indications products [8], in the new *Trademark Act*, misleading registration and usage of trademarks with geographical indication are forbidden[9]; and in *Implementing Regulations of the Trademark Act*, geographical indications can be applied and registered as collective trademarks or certification

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trademarks.

Generally speaking, China continuously adjusts and perfects the protection of geographical indications with the development of time, while the United States hopes China to quicken the pace and further increase the protection of American geographical indications by simplifying the application, acceptance, review, approval requirements, etc., to adapt the Sino-US trade demand. So China always pays attention to balancing the right protection of foreign obliges in China in legislative and judicial practice.

10. Other Aspects

Many other details are stipulated in Chapter intellectual property hereof, which aren't introduced one by one due to limited space, mainly including (1) China shall provide enforcement procedures for E-commerce infringement case. China's law enforcement agencies shall rapidly take down infringing products. The right holders propose extending to 20 working days as the deadline to file a judicial or administrative complaint. (2) About software protection, "The Parties shall ensure that all government agencies and all entities that the government owns or controls install and use only licensed software." China shall employ qualified third parties not belonging to or affiliated to the government for annual audit within seven months after the validation of this Agreement and publish the audit results on the internet. So does the United States. (3) To strengthen trademark protection, the Parties shall ensure adequate and effective protection and enforcement of trademark rights, particularly against bad-faith trademark registrations. (4) Strengthen the protection of copyright. In the absence of the relevant proof, the person whose name is indicated as the author, producer, performer, or publisher of the work, performance, or phonogram in the usual manner is the designated right holder in such work, performance.

11. Conclusion

According to the first phase of the economic and trade agreement between China and the United States, a large number of laws and regulations will be revised or adjusted in the foreseeable future. These legal changes do not mean substantive concessions but are necessary steps for China to improve its legal system. Since China has reserved enough room for legal amendments in the process of formulating relevant laws, especially procedural laws, the revision of relevant laws in China will not shake the foundation of China's legal system and system, on the contrary, it may make China's legal norms denser.

In the field of protection of intellectual property, China shall thoroughly learn from the legal system of western developed countries such as America, etc. to perfect the legal norm of intellectual property. China far falls behind America in terms of the research and legislation technology of intellectual property. Hence, in allusion to the requirements proposed by America in this Agreement, China's legislative body shall modify and perfect legal system about intellectual property in accordance with internationally-accepted standards, and carry out scientific legislation and implement laws reasonably in combination with China's national conditions so that China can develop rapidly in the field of intellectual property protection, creating a fair and reasonable market environment.

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Study on the Relationship Between the Audit Committee of Ipo Firms and the First-Day Stock Earnings

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ABSTRACT

This paper mainly discusses the relationship between the audit committee of IPO firms and the stock returns on the first day of trading on the stock exchange. Using the sample of 21 firms that made an initial public offering in ASX between 2008 and 2010, Regression analysis was used to conclude that the existence of the audit committee of IPO firms and listed on the first day of the stock returns have no significant direct relationships. The result shows that the audit committee has no effect on the earnings of the first day of listing, and the establishment of the audit committee may not be considered before listing.

1. Introduction

With the emergence of profile financial and accounting scandals in the early 21st century, the Sarbanes-Oxley Act emphasized the importance and functions of the audit committee. Since then, the public emphasize the existence of the audit committee and scholars are interested in the impact of the audit committee on the company in different aspects (Defond and Francis, 2005). This article aims to examine whether the IPO firms' audit committee will affect the stock returns on the first day of trading on the stock exchange. The audit committee could enhance corporate governance, strengthen oversight, and ensure the quality of financial reporting, which influences stock price and returns indirectly.[1] Although similar studies have been conducted in previous literature, the amount of literature is not sufficient, and they choose non-Australian IPO companies as objects. Prior research is rarely involved in companies listed in the ASX. Therefore, this article uses the empirical analysis method, selects 21 ASX listed companies which become IPO during 2008-2010, and conduct the regression analysis to study the relationship between IPO firms' audit committee and stock returns on the first day of trading on the stock exchange. The result contributes to enrich the literature on audit committees and stock returns in Australia, as well as explore the influence of audit committees on stock return to provide a reference for pre-IPO companies to determine to establish audit committees or not.

2. Literature Review

There's a lot of research on audit committees and stock

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returns. Azzoz and Khamees (2016) suggest the audit committee can be used as a factor to measure the corporate governance mechanisms. The existence of the audit committee improves the controlling and monitoring process of the company. [2]They select financial companies listed in the Amman Stock Exchange (ASE) for the period span 2007 to 2012 and conclude that there is a statistical relationship between stock return and the audit committee. Vander Zahn (2008) examines the relationship between different personal characteristics of the audit committee members of IPO companies and the level of first-day return. The sample of 322 Singapore IPOs listing on the Stock Exchange of Singapore (SGX) from 1997 to 2004 is utilized in regression analysis, and empirical results indicate no overwhelming association between the personality features of IPO audit committees and first-day returns. Beasley (1996) states that a functioning and independent audit committee can enhance the quality of disclosure, ensure the authenticity and reliability of financial information, and effectively reduce the probability of fraud. Haggard, Martin, & Pereira (2008) point that more disclosure and better transparency can enhance investors' trust and confidence in the company and more disclosure of information can enable investors to make more accurate assessments and make investment decisions, which contributes to the increase of stock prices.[3] Combined with the aforementioned literature, the existence of an audit committee has a positive effect on the quality of corporate governance and information disclosure, which influences the stock return indirectly. However, previous researches focus on various objective. There is no clear literature states that the correlation between the existence of the IPO firm's audit committee and the first-day stock returns is positive or negative.

3. Hypothesis Development

The audit committee contributes to a relatively higher level and more efficient corporate governance, improves companies control activities, and enhances the cooperation between internal and external auditors. The functioning audit committee could improve the quality of financial reports, enhance the transparency of the company, reduce the information asymmetry, and transfer more useful and credible information for investors and the public. The information users will evaluate the company and predict the future operation condition more accurately, which increases investors' confidence in the company.[4] Based on the efficient market hypothesis, the impacts caused by the auditor committee will increase the stock price and investors will demand a lower return, the stock return will decrease. According to the above analysis, the following hypothesis is put forward.

Hypothesis 1: The presence of IPO firms' audit committee is negatively associated with the stock returns on the first day of trading on the stock exchange.

4. Research Method

This paper uses the empirical analysis method. Microsoft Excel is used to conduct the regression analysis. The detailed definition of variables and raw data are displayed in Tables 1 and Table 2 respectively. LNRETRUN is the dependent variable. AUDCOM the variable of interest. The BIGN, LNBSIZE and LNASSETS are the control variables. The ε is the error term. The regression models are designed as follows.

$$LNRETURNi = \beta_0 + \beta_1 AUDCOMi + \beta_2 BIGNi + \beta_3 LNBSIZEi + \beta_4 LNASSETSi + \varepsilon i$$

As for the data and sample selection, this paper randomly selected 21 companies that made an initial public offering in ASX during 2008-2010, and ignore FUND and TRUST. The closing price of IPO's first day is collected from Yahoo Finance. The rest of the data comes from the IPO prospectus or disclosure documents released in the DatAnalysis premium [5] The raw data is exhibited in Appendix A.

Table 1. Definition of variables used in regression analysis

Abbreviation	Definition
LNRETURN	Natural logarithm of (1 + stock returns of an IPO firm on the first day of trading on ASX)
AUDCOM	Dummy variable set to one if an IPO firm has the presence of an audit committee and zero otherwise
BIGN	Dummy variable set to one if an IPO firm employs an external auditor from the member of BIGN and zero otherwise. The BIGN includes Ernst & Young, PricewaterhouseCoopers, KPMG and Deloitte Touche Tohmatsu.
LNBSIZE	Natural logarithm of the number of directors on the board of an IPO firm
LNASSETS	Natural logarithm of total assets value recognized on the proforma balance sheet of an IPO firm
I	An IPO firm

Table 2. Raw data collected from IPO prospectuses

Abbreviation	Definition
RETURN	Stock return on the first day of trading on the stock exchange of an IPO firm (infraction) = (Closing share price on the first day of trading on the stock exchange - IPO issue price)/IPO issue price)
BSIZE	Number of directors on the board of an IPO firm disclosed in the IPO prospectus
ASSETS	Number of directors on the board of an IPO firm disclosed in the IPO prospectus

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5. Results

The descriptive statistics and regressions results are displayed as Table3 and Table4.

Table 3. Descriptive statistics

	Mean	Median	Standard Deviation	Min	Max	N
LNRETURN	0.30741075	0.09531018	0.64856615	-0.21072103	2.19555652	21
AUDCOM	0.57142857	1	0.50709255	0	1	21
BIGN	0.38095238	0	0.49761335	0	1	21
LNBSIZE	1.44815950	1.38629436	0.24899847	1.09861229	1.79175947	21
LNASSETS	16.63268172	16.23046584	1.44772821	13.94443134	20.43295765	21
RETURN	0.86700711	0.1	2.309827935	-0.19	7.985	21
BSIZE	4.38095238	4	1.07126983	3	6	21
ASSETS	61155744.81	11189270	160865476.42	1137600	748033000	21

Table 3 exhibits Mean, Median, Standard Deviation Min Max, and N of each variable. The Mean of LNRETURN is 0.30741075, the Minimum and Maximum -0.21072103 and 2.19555652 respectively. The mean of AUDCOM is 58%, which suggests more than half IPO companies own the audit committee. 38% of 21 companies use BIG4 audit firms as their auditor. The range of Return is from -0.19 to 7.985. As for the board size, the average director number is 4 (rounded), the company with the least board of directors has 3 board members and the largest is 5. There is also a wide gap in total assets between companies, ranging from 1137600 to 748033000, the mean is 61155744.81.

Table 4. Regression results

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.955510312	2.265974086	-0.421677511	0.678871
LNASSETS	0.074077267	0.143488659	0.51625869	0.612735
LNBSIZE	0.224442655	0.688379095	0.326045136	0.748616
AUDCOM	-0.586442749	0.363076853	-1.615202799	0.125811
BIGN	0.107359449	0.435708662	0.246401916	0.808504
Number of observations		21		
R Square		0.157255488		
Adjusted R Square		-0.05343064		
Standard Error		0.665667341		

Table 4 exhibits the regression result. The R square is about 20%, which indicates 20% of the sample could be explained by the regression model. The coefficient of AUDCOM is -0.586442749, which reveals there is a negative relationship between LNRETURN and AUDCOM. The corresponding P-value is 0.125811, which is larger than 0.1, it states the coefficient is statistically insignificant. In conclusion, the LNRETURN is statistically insignificant and negative with the AUDCOM, which cannot support the Hypothesis 1.

6. Conclusion

This article aims to examine whether the IPO firms' audit committee will affect the stock returns on the first day of trading on the stock exchange. Due to the statistically insignificant and negative relationship between the LNRETURN and AUDCOM, the hypothesis is not supported. We can't prove that there is a clear connection between the IPO firms' audit committee and stock returns on the first day of trading on the ASX.

7. Limitation of Study and Future Research

This article owns the following limitations.

a) The sample is too small, the regression results are easily influenced by extreme value, which leads to the inaccuracy of the regression result. Otherwise, the R square is only 20%, which means the regression model only explains about 20% of the sample, is not persuasive and lack of representativeness.

b) Only companies listed in ASX between 2008 and 2010 have been sampled. The time range is relatively short. The impact of the audit committee on the company will change over time, so the time range should be expanded and also collected samples from other stock exchange because Different stock exchanges have different conditions for listing

c) This paper only considers the existence of the audit committee, but does not set up indicators to measure the effectiveness of the audit committee. Only when the audit committee is running functioning, it can accord with our hypothetical development. This metric should be set in the future research.

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Appendices

No	ASX CODE	LN RETURN	LN ASSETS	LN BSIZE	AUDCOM	BIGN	RETURN (IN FRACTION)	BSIZE (NUMBER OF DIRECTORS ON THE BOARD)	ASSETS (AU$)
1	ATC	-0.020202707	15.56563225	1.386294	0	0	-0.02	4	5,755,303
2	1AG	0.083881484	15.9044454	1.791759	0	0	0.0875	6	8,076,308
3	AAJ	-0.210721031	15.39051022	1.098612	0	0	-0.19	3	4,830,740
4	AIR	0.433080275	13.94443134	1.609438	1	0	0.542	5	1,137,600
5	AUC	-0.139262067	15.83491317	1.386294	1	0	-0.13	4	7,533,823
6	ABX	0.438254931	15.60443117	1.609438	0	0	0.55	5	5,982,991
7	CMM	0.300104592	16.34960515	1.386294	1	0	0.35	4	12,605,013
8	EFE	0.371563556	15.46591247	1.386294	1	0	0.45	4	5,209,073
9	EVS	-0.008032172	16.59246474	1.386294	1	1	-0.008	4	16,070,000
10	EPW	0.033711057	20.43295765	1.791759	1	1	0.034285714	6	748,033,000
11	FDM	0.09531018	17.37653746	1.386294	1	1	0.1	4	35,199,325
12	GCY	-0.077961541	16.23046584	1.098612	0	0	-0.075	3	11,189,270
13	HCH	0.048790164	15.91061283	1.098612	0	0	0.05	3	8,126,272
14	IRD	0.270027137	15.44448793	1.098612	0	0	0.31	3	5,098,658
15	MLD	0.371563556	18.68545443	1.609438	1	0	0.45	5	130,313,603
16	MYE	0.09531018	17.83495196	1.609438	1	1	0.1	5	55,670,000
17	PDI	2.148850993	16.12768156	1.609438	0	0	7.575	5	10,096,320
18	RFX	-0.15082289	16.98654846	1.386294	1	1	-0.14	4	23,832,207
19	RVA	0.127833372	18.11370711	1.791759	1	1	0.136363636	6	73,567,000
20	TER	2.19555652	18.26669644	1.098612	0	1	7.985	3	85,728,548
21	XAM	0.048790164	17.22386848	1.791759	1	1	0.05	6	30,215,587

Appendix A Raw Data-Set

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The Status and Role of Competency Model in Enterprise Human Resource Management

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ABSTRACT

The competency model is a widely-used human resource management tool that can be applied to human resource management in different regions, different fields, different enterprises, and positions of different nature, which can improve the objectivity, reliability, authenticity and fairness of enterprise human resource management, give full play to the promotion of human resource management to the development of enterprise operations, and help enterprises achieve development and management goals.

1. Introduction

In the process of human resource management of an enterprise, if the competence model is divided according to different standards such as business processes, roles, and positions within the enterprise, synthesizing these standards together to describe the competency model with different employee characteristics, and use it as a specific standard to measure the work behavior of employees in a certain position, thus forming a competency model. Nowadays, with the rapid development of the socialist market economy, the market competition is becoming fiercer, if an enterprise wants to achieve its own healthy and sustainable development, it must focus on managing the internal human resource of the enterprise, comprehensively measure the working status, work efficiency and work results of employees, and weigh the comprehensive capabilities of employees, and use it as an important information for employee promotion and development, in order to stimulate the work enthusiasm of employees, urge employees to consciously and actively comply with the regulations of the enterprise's positions, realize the management of human resource, and lay the foundation for the healthy development of the enterprise.

2. The Status of Competency Model in Enterprise Human Resource Management

Compared with the traditional analysis of employee competence and quality, in the process of constructing competency model, "people" should be taken as the core content, and attentions should be paid to the details of the work

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completed by the employees in the process of work, and pay attention to the way in which the employees achieve their work goals and how to complete the work goals, so as to reflect the ability and quality of employees, it is used as an important guidance material in enterprise recruitment, employee training and performance management.

Competency model is an important development tool in human resource management of enterprises, which is paid special attention by enterprise managers and human resource managers. With the rapid development of knowledge economy in modern society, more and more knowledge talents appear in enterprises, the original employee analysis has been unable to meet the enterprise's employee management needs. At this time, the competency model is used by the enterprise in human resource management, becoming an important means of human resource management strategy. For enterprise organizations, the application of competency model can strengthen the connection between individuals' visions of enterprise organizations, enterprise strategic development and market opportunities; for enterprise managers, the competency model provides important information for carrying out human resource management and mastering the overall situation of enterprise employees; for employees, the ability organization model can provide them with clear work standards, guide employees "what needs to be done", and provide guidance for employees' independent development and growth[1].

In enterprise human resource management, the competency model can be reflected in various forms, providing a unified standard and overall framework for enterprise managers, human resource management staff, and post employees, it can be used by enterprises as an important means to improve competitive advantage and performance management, an effective communication tool, and an effective way to integrate human resource.

3. The Role of Competency Model in Enterprise Human Resource Management

Firstly, it can standardize employee training. In the process of enterprise human resource management, the enterprise uses the competency model to conduct an all-round evaluation and assessment of employees, so as to find out the shortcomings of employees' work advantages and capabilities, and use it as the basis for the training plan, find the key points for employee training, formulate a scientific and reasonable employee training plan, and improve the working ability and comprehensive literacy of employees in a purposeful and planned manner. The main purpose of training for employees is to enable them to master the basic knowledge, skills and other abilities required in the job; in this process, we can give full play to the role of the competence model, to the greatest extent, ensure that the skills obtained by employees participating in training can be applied to the actual work process[2].

Secondly, it helps to optimize the allocation of employee resource within the enterprise. Staffing is an important part of enterprise human resource management. Different job positions have different requirements for employees' comprehensive capabilities and professional skills. Using the competency model, we can accurately analyze the qualities and abilities of employees, in order to match employees with more suitable job positions, give full play to the advantages of corporate employees, realize the optimal allocation of internal human resource, and improve the overall management capabilities of the enterprise.

Thirdly, it helps to carry out corporate talent selection and recruitment activities and improve the efficiency of talent recruitment. In enterprise management, the higher the personal quality of employees than the actual needs of job jobs, the more likely it is to create more work value. Therefore, enterprises can use the competency model as an important tool for selecting and recruiting talents, and analyze and evaluate the abilities of job applicants, so as to ensure that the qualities and abilities of the talents employed are far higher than the job requirements, creating more value for the enterprise; at the same time, the ability and quality requirements of specific positions can also be used as the basic standard for talent selection, so as to achieve the selection and classification of talents, prompt enterprises to accurately locate talents and positions, achieve the goal of "directional recruitment", and improve the efficiency of human resource management .

Finally, it helps to improve performance management and optimize salary management. From the perspective of the competency model, the enterprise carries out performance management and salary management, which is mainly based on the process of employees' completion of business goals, and integrates the enterprise's organizational vision, development needs, and organizational expectations into employees' personal work behaviors, as a standard for assessing employees' performance evaluation results, and laying a scientific management foundation. For some more complex jobs, the enterprise using a single KPI system have been unable to fully measure the work behavior and value of employees, at this time, we can use the competency model and specific competence indicators to compare and analyze the advantages and disadvantages of employees to calculate the performance evaluation rewards or punishment of employees, so as to promote the working process of employees to be closely connected with their job growth, bonus floating, welfare treatment, career promotion, etc.

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4. How to Give Full Play to the Role of Competency Model in Human Resource Management

4.1 Combining the Enterprise's Development Goals, Put Forward the Ability and Quality of Employees

In order to give full play to the role of the competency model in enterprise human resource management, in the process of constructing the competency model, it is necessary to combine the actual situation of the enterprise and consider the current situation, development needs and development goals of the enterprise, respectively, by clarifying the development goals of the enterprise, and elaborating the work goals of employees in different departments and positions, this is used as the purpose of employees' work and as a standard for improving the ability and quality of employees. Staff should combine the business department, technical department, sales department, logistics department and other departments of the enterprise, consider their position and development needs in the process of human resource management, and propose the qualities that employees in different departments need to have, for example, employees in the business department need to have good communication and sales capabilities, be able to coordinate the relationship between customers and the enterprise, etc.[3].

4.2 Formulate Specific Performance Appraisal Standards and Weigh Employees' Comprehensive Capabilities

In order to give full play to the role of the competency model in enterprise human resource management, specific and clear performance evaluation indicators must also be proposed, and the employee quality standards in the competency model should be quantified into specific evaluation items to measure the comprehensive capabilities and qualities of the employees. In this process, we can propose a reservation goal for the job, and then measure and analyze the employee's various work performance, judge the situation of completing the job goal, analyze and inspect its work process, so as to restrain and motivate employees, encourage employees to actively follow the rules of the enterprise, and realize the independent development and growth of employees[4].

4.3 Collect Data Extensively and Lay the Foundation for Model Building

In order to give full play to the role of competency model in enterprise human resource management, we must recognize the importance of data. in the process of constructing the competency model and using the model, to convince employees of the model is to obtain the support of the employees and encourage them to realize the fairness and objectivity of the model. Based on this, we can understand employees' perception and experience of positions through questionnaire surveys and informal communication, and optimize and integrate questionnaire data, and use it to obtain reference data and use it as the basis for model building to form a model that "returns to the public", improve the credibility of the model, and give full play to the role of the model[5].

4.4 Flexible Use Competence Models to Promote the Healthy Development of Enterprises

In order to give full play to the role of the competency model in enterprise human resource management, it is necessary to use this model flexibly and apply it to all aspects of enterprise human resource management., for example: recruitment of new employees, employee training, employee performance appraisal. In the recruitment process of new employees, we must first grasp the applicant's application purpose, understand its target position and target salary needs, and then conduct investigation and communication with the applicant according to the ability and quality standards in the competence model of different positions, and analyze the knowledge literacy, professional skill level, job ethics and sense of responsibility of employees, make a rough judgment on them, obtain more accurate judgment results, and use it as an important basis for hiring staff[6].

In the training process of enterprise employees, according to the competence model corresponding to different departments and positions, the standards required by the model for the ability and quality of employees can be extracted. These standards are used as the main materials for formulating training plans, and ability and quality are used as the basic dimension. Specific training activities are carried out from each dimension to promote employees to improve and develop a certain ability through participating in training activities. For performance appraisal work, enterprises can correspond and analyze the various indicators of employees according to the competence model, which finally reflects whether employees can provide assistance to the progress and development of the enterprise, and whether the presence of employees hinders the construction of corporate culture, internal management, etc., so as to do rewards and punishments for performance evaluation and achieve efficient human resource management[7].

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5. Thoughts on the Application of Competence Model in Human Resource Management of Enterprises

For enterprise human resource management, the competency model is a good management tool, but it will inevitably encounter some problems in the process of use. After all, this is just a model and cannot be completely covered by every individual employee. Therefore, when using this model in enterprise human resource management, it should be noted that this model is by no means static, however, it needs to be constantly adjusted and adjusted according to different enterprise development needs, different department work scopes, different job responsibilities and obligations, and different business processes; a good competence model needs to be able to promote the enterprise's employee recruitment, employee performance assessment management, employee training and its development[8].

In the process of enterprise human resource management, in order to build a good competence model suitable for the development of the enterprise, it is necessary to fully mobilize the human, material and financial resources of the enterprise and invest a lot of time to think from multiple angles of enterprise managers, enterprise human resources managers, ordinary employees of the enterprise, and enterprise development, and in the process of practice, it continuously finds hidden problems and constantly corrects them, so as to improve the overall level of the competence model, which plays a role in promoting the development of the enterprise.

6. Conclusion

In summary, to apply the competency model to human resource management, enterprises must adhere to the principle of "seeking truth from facts" and establish a model that can meet their own development needs according to their actual situation, only in this way can the enterprise truly play the role of the competency model, become stronger from the root, and improve the core competitiveness of the enterprise. In the process of the construction and application of the competency model, the enterprise should combine the development goals, put forward the employee qualities needed for the development of the enterprise, and formulate detailed and specific performance evaluation standards, which will be used as a measure of the employee's competency. In addition, enterprises must flexibly use the competency model to apply it to recruitment, employee training and performance appraisal and other links to give full play to their role and provide assistance for the healthy development of the enterprise.

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Research on Innovation of Floating Production Storage and Offloading Unit's Rent Mode under Low Oil Price

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ABSTRACT

After many years of exploitation, onshore oil and gas resources are about to enter a recession period. Oil and gas will mainly come from oceans in the future. Generally speaking, the exploration and production (E&P) cost of oil from offshore is much higher than that of oil from onshore, so it is more sensitive to oil price. However, in recent years, oil price has been hovering at a low level for a long time, almost close to or even lower than the E&P cost of oil, which directly affects the development of oilfields. Besides the influence of oil price, some oilfields present the characteristics of marginal reserve scale, short peak production period and output rapidly declining. There leads to short economic life period and makes the economic benefit close to or lower than oilfield's hurdle rate, which increases the difficulty of offshore oilfield development. As an important part of oilfield development, Floating Production Storage and Offloading unit, its investment mode and rent mode directly affect overall oilfield's rate of return and the economic life. This paper chooses lease mode as the research object based on the analysis of investment mode, and further puts forward rent mode related with oil price through the analysis of traditional rent mode, and illustrates the advantages and disadvantages of various rent modes and their applicability so that the lessor chooses the right mode to achieve Win-Win with Oil Company and promotes the development of oilfields under low oil price.

1. Introduction

Floating Production Storage and Offloading, hereinafter referred to as FPSO, is an "Offshore Oil Plant" which integrates the functions of production, processing, storage and offloading. It is the offshore oil production unit which is widely applied currently. It has the characteristics of high technology, large application range and long life cycle. Along with the continuous progress of technology, the operation scope and ability of FPSO are expanding and improving continually, which has become the mainstream means of offshore oil and gas development for different water depth and different environmental conditions [1]. The concept ship, FAST4WARD, is built in bulk. It realizes the standardization of FPSO's construction and delivery, reduces the cost of construction, and accelerates the period of delivery, which make the application of FPSO more rapid.

According to survey data of 2018 Global Floating Pro-

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duction Storage and Offloading Units (FPSO), the number of global FPSO in service was 183 by the end of 2018. According to International Maritime Association (IMA) analysis, the order number of FPSO is 32 to 58 from 2019 to the end of 2023, and the most likely number is 49, and 30-35% of projected FPSO over the next five years will be used in Brazil. Hence, the market demand of FPSO is still very broad [2].

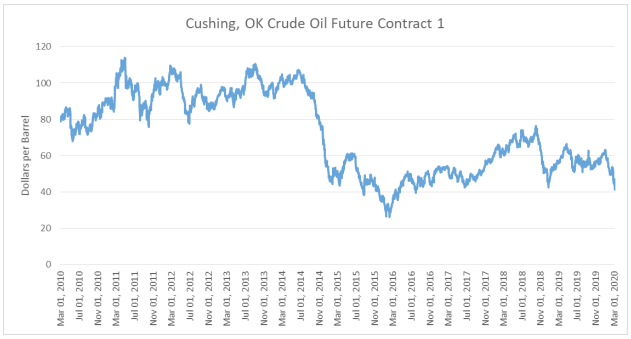
2. Analysis on FPSO's Investment Mode

FPSO is a capital intensive industry, and its construction requires high initial funding and large amounts of financing. The total investment in oilfield development mainly includes exploration expenditure, development investment, oilfield operation cost and discard expense. FPSO's investment accounts for 20-40% of oilfield's total investment, so it is crucial for oilfield development [3].

FPSO investor, namely shipowner, is divided into two categories: one is oil companies, such as CNOOC, currently 16 FPSOs in China, 8 of which is owned by CNOOC. The other is FPSO professional operators, such as SBM, MODEC, BW Offshore, and Bumi Armanda. CNOOC Energy Technology & Services Limited is the only professional operator in China with 8 FPSOs, and ranks fifth among the global FPSO operators. Nowadays, oil companies in the world are more and more inclined to lease FPSO from operators. FPSO's investment, construction and operation is taken by Operators. On the one hand, through leverage, oilfield's overall rate of return can be increased, on the other hand, it avoids taking up a large amount of funds early to affect oil company's cash flow, at the same time, reduces the risk of oil company's investment and operation. Oil Company can concentrate on oil exploration, development, production and sales [4]. At present, the number proportion of Oil Company's own and lease is 50%, not only in China, both also in the world, and there is also an upward trend in the future to lease FPSO, which is a rare development opportunity for professional operators. This paper only analyzes FPSO's lease mode, and does not consider the mode that FPSO is invested by Oil Companies.

3. Analysis on FPSO's Traditional Rent Mode

Oil price has fallen sharply since 2014 and keep low for five years, which have exhausted major international oil companies. Cost decreasing and benefit increasing is also difficult to meet the demands of oilfield development.



Data source: US Energy Information Administration website (EIA, https://www.eia.gov/).

Figure 1. Crude Oil Futures Contract Price of Cushing in the last decade

Besides the influence of oil price, at present, the exploitation of some offshore oilfields also take on the following characteristics:

1) Crude oil price approaches oil operation cost, and oilfield development's economic benefit is critical to the hurdle rate.

2) The scale of oilfield reserves tends to be marginalized, and it also shows the characteristics of short peak yield period and output rapidly declining, which causes oilfield's short economic life period [5].

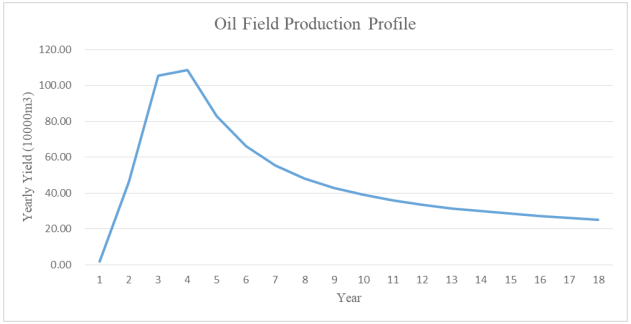


Figure 2. Current typical offshore oilfield yield profile

Normally, FPSO's lease term is consistent with the economic life period of the target oilfield, and its investment accounts for a large proportion of oilfield's total investment. Therefore, FPSO's rent mode is very important for oilfield's economic life period and economic benefit.

Nowadays, FPSOs in service outside China only adopts the mode of full fixed rent, while FPSOs in service within China mainly adopts the mode of both full fixed rent and fixed rent plus bonus on barrel.

Under the full fixed rent mode, FPSO's rent has nothing to do with the oilfield output and oil price, and the lessor will not bear the risk caused by the actual output of the oilfield which is lower than expected and low oil price. Therefore, they have stable revenue. This is the least risk mode. However, in this mode, the pressure is also the

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greatest for oil companies, oilfield's economic life period may be further shortened by comparing the mode FPSO invested by oil companies, and in the period of oil price's large fluctuations or low keeping, actual oilfield revenue is lower than expected, which reducing the confidence of oil companies to develop target oilfields. However, in fact, fixed rent mode of FPSO in China is often not absolutely fixed, in the oilfields with a rapid decline in output, a stepped rent mode which is high in front and low in back can ensure that the economic life of the oilfields will not be significantly reduced, but also FPSO's lessors can recover investment quickly.

Under fixed rent plus bonus on barrel, partial rent is related with the oilfield output, which conforms to the oilfield output trend. Compared with the full fixed rent mode, the economic life period of the oilfield can be extended appropriately, and the pressure caused by the uncertainty of oilfield output can be reduced. For FPSO's lessors, under the premise of ensuring the minimum revenue, although taking some risks of oilfield output, they enjoy the extra benefits brought by excess production.

The influence of FPSO rent on the economic life of oilfields mainly depends on the revenue proportion between fixed portion and bonus portion. As an example of the oilfield production trend in Fig. 2, the effect of two rent modes on the economic life of the oilfield is simulated and analyzed. According to Fig. 3, the mode of fixed rent plus bonus on barrel can extend the economic life period of the oilfield for 2 years by comparing full fixed rent mode. For the purpose of showing more clearly the effect of production bonus on the economic life of the oilfield, the ultimate state that rent is linked entirely with output is presented. Provided that other conditions are invariant, this rent mode completely conforms to the trend of the oilfield and can extend the economic life period of the oilfield for another two years. However, this mode is too risky for FPSO's lessors, so it is not recommended to adopt it.

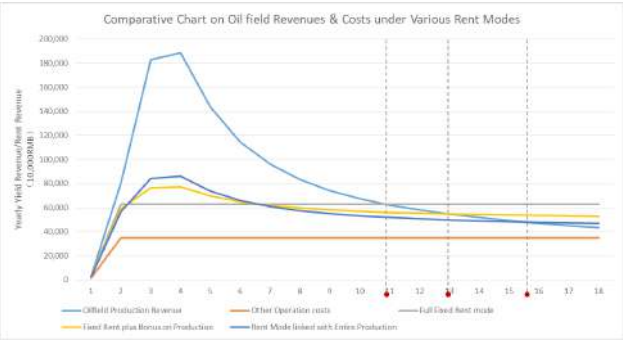

Figure 3. Comparative Chart on Oil field Revenues & Costs under Various Rent Modes

4. Study on FPSO Rent Mode Related with Oil Price

Nowadays, with the development of oilfield exploration technology, oilfield operators have gradually transferred the worries from the uncertainty of oilfield output to that of oil price, so it is time to put forward FPSO's rent mode related with oil price.

Principles for the design of rent mode related with oil price:

1) For lessors, the risk is controllable and the revenue is guaranteed;

2) And lessors and Oil Companies could reach Win-Win, and jointly promotes oilfield development [6].

Based on these principles, the rent is divided into two parts: fixed rent and bonus on oil price. Fixed rent can be determined by the required rate of return plus downward floating point, which is regarded as the basic rate of return, downward floating point can be confirmed by the assessment of oil price risk.

On the basis of fixed portion, Bonus on oil price is set-up by two steps:

Step 1: According to the expected oilfield output distribution, calculate the bonus on barrel at the range of benchmark oil price, so that internal rate of return reaches the required rate of return.

Step 2: Determine the benchmark oil price range or the benchmark oil price point by the average oil price within a certain period. After that, consider the extreme cases to determine the upward and downward floating oil price points in order to get the maximum and minimum. So that in the extreme cases during all period of operation, when the real-time oil price is lower than the minimum or is higher than the maximum, both the lessor and oil company can accept the losses under this mechanism.

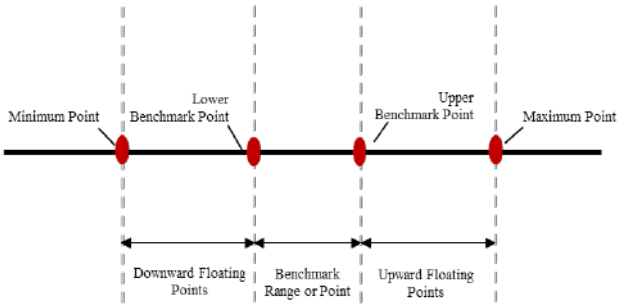

Figure 4. Oil price range diagram

Assuming that the actual output of the oilfield is not taken into account, that is, the actual output is consistent with the expected, the revenues linked with oil price is analyzed as follows.

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1) When real-time oil price is within the range of minimum point and lower benchmark point.

When real-time oil price is less than minimum point, the real-time oil price in the formulas equals to the minimum point, and revenue linked with Oil Price is 0, that is, only fixed rent is collected.

$$\begin{aligned}&\text{Revenue linked with Oil Price}\\&=\text{Bonus on barrel at the range of Benchmark Oil Price}\\&\times\left[1+\frac{1}{\text{Downward Floating Points}}\times\left(\text{Realtime Oil Price}-\text{Upper Benchmark Point}\right)\right]\end{aligned}$$

2) When real-time price is at or within the benchmark range

Revenue linked with Oil Price is equal to bonus on barrel under the benchmark oil price. Benchmark oil price can be showed in the form of interval or point, if point, the upper and lower benchmark oil price points overlap.

3) When real-time oil price is within the range of upper benchmark point and maximum point.

$$\begin{aligned}&\text{Revenue linked with Oil Price}\\&=\text{Bonus on barrel at the range of Benchmark Oil Price}\\&\times\left[1+\frac{1}{\text{Upper Floating Points}}\times\left(\text{Realtime Oil Price}-\text{Upper Benchmark Point}\right)\right]\end{aligned}$$

When real-time oil price is higher than maximum point, the real-time oil price in the formulas equals to maximum point.

For operability, two key points should be also determined in practice: one is the source of real-time oil price, which can be adopted the price of Cushing crude oil futures. Cushing crude oil futures price is the pricing point of West Texas Intermediate (WTI) futures which is the world's largest trading volume. WTI is the primary crude specified for delivery to Cushing, OK under the NYMEX futures contract. Therefore, the comparable inventory in Cushing is the key factor dominating the global oil price, so it is reasonable to choose the Cushing crude oil futures contract price as real-time oil price [7]. Another is the method of determining the real-time oil price. Generally speaking, FPSO's rent is settled at the end of the month and paid at the beginning of next month, so we can consider calculating the monthly average oil price as the real-time as a cycle from the previous settlement date to the current settlement date[8].

Normally, before first oil, oilfield's output is based on the distribution data provided by the oil company. If the output is constant, that is, only bonus on oil price, the lowest rate of return is the same as confirmed basic rate of rate. In practice, both parties come to an agreement that the output is subject to the actual, which can realize the revenue linked with both barrel and oil price.

5. Analysis on Rent Mode's Advantages & Disadvantages and Applicability

The rent modes mentioned in this paper are analyzed with the advantages & disadvantages and applicability, so that FPSO's lessor could choose the right mode according to the details of oilfield.

5.1 Full Fixed Rent Mode

Advantage: For FPSO's lessor, the revenue is stable and the risk is minimal.

Disadvantage: Compared with Oil Company as shipowner, the rent will reduce the economic life of the oilfield, and then affect the oilfield benefit.

This mode is applicable to oilfields with high rate of return and the output slowly declining, and the lessor is lack of confidence in expected production and future crude oil price.

5.2 Fixed Rent Plus Bonus on Barrel

Advantage: ① For FPSO's lessor, on the basis of ensuring the basic revenue, when the actual output is higher than expected, they can get extra profits. ② The economic life period of the oilfield can be extended appropriately compared with full fixed rent mode.

Disadvantage: The lessor takes a certain risk of production.

This mode is applicable to oilfields with the hurdle rate achieved and the output fast declining, and the lessor is optimistic about expected production and pessimistic about future crude oil price.

5.3 Fixed Rent Plus Bonus on Only Oil Price

Advantage: ① Based on ensuring the basic revenue, FPSO's lessor can obtain the extra profits brought by high oil price. ② it can ensure the continued exploitation of oilfields under sustained low oil price. ③ it can extend the economic life of the oilfield to a certain extent.

Disadvantage: FPSO's lessor bears a certain risk of low oil price.

This mode is applicable to oilfields with the hurdle rate achieved and the output fast declining, and the lessor has confidence in long-term higher crude oil price.

5.4 Fixed Rent Plus Bonus on Both Barrel and Oil Price

Advantage: ① Based on ensuring the basic revenue, FPSO's lessor can obtain the extra profits caused by high production and high oil price. ② it can ensure the continued exploitation of oilfields under sustained low oil price and low production. ③ it can prolong the economic life of

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the oilfield.

Disadvantage: the lessor takes risks of low oil price and low production.

This mode is applicable to oilfields with the hurdle rate achieved and the output fast declining, and the lessor is optimistic about both expected production and future crude oil price.

6. Conclusion

Based on the analysis of the traditional rent mode, this paper puts forward the rent mode linked with oil price which can realize the risks sharing and benefits sharing with oil company under ensuring the basic revenue of FPSO's lessor and promote the development of oilfields under low oil price, according to the current trend of oil price and the current characteristics of oilfields.

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The Impact of Cost Information Sharing on Procurement Contract Design

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ABSTRACT

In this paper, we provides contract design mechanisms and analysis for manufacturers to manage decentralized supply chain. Suppose the manufacturer's final product consists of components, each produced by a different supplier, and the manufacturer first purchases components from suppliers, then assembles them into final product and meet demands aftermarket realization. While supply chain's internal cooperation always benefits both, suppliers are often reluctant to proactively share their own production cost structure, otherwise manufacturers may depress purchase prices, which may reduce supplier's profit. Manufacturers on the other hand, prefers to be informed of true cost information in order to gain greater revenues. We takes manufacturer's perspective and design the optimal contract menu for suppliers, both to enable suppliers to disclose private cost information and to maximize the benefits. We start by modeling the original problem and find that the original problem is a complex multidimensional optimization problem. We then examine the nature of the original problem solving and devise the solution algorithm to arrive at the optimal contract menu. This algorithm reduces the complexity of the original question from o(2 n) to o(n). We further investigate the influence mechanism of model parameters on the results and find that when market demand increases or the selling price of the final product increases, value of private information increases significantly. However, if market demand uncertainty increases, the value of information may increase or decrease for both sides.

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1. Introduction

As the complexity of supply chain grows continuously, it is insufficient for big manufacturers to satisfies their demand completely by their own. For example, Ford outsources 65% of its own components, General Motors outsources over 55% and Crysler over 80%[1]. In general, big manufacturer have plenty of upstream suppliers. Coordination with suppliers is the major challenge constantly faced by big firms.

Information sharing refers to the sharing of private information between supply chain enterprises to achieve upstream and downstream cooperation and enhance the overall effectiveness of the supply chain. Many branches in the logistics field can collaborate effectively by sharing information. Information sharing between suppliers and manufacturers allows both parties to make optimal production and replenishment strategies, reduce supply chain uncertainty, reduce overall costs, and improve customer service. The information shared between companies can be divided into the following categories: inventory information, sales information, and demand forecast information, order status information, production planning information, etc. Among them, inventory information and production planning information is two-way shared by upstream and downstream enterprises, sales information and demand forecast information are generated by manufacturers and shared with upstream suppliers. In contrast, order status information is held by suppliers in real-time and shared with manufacturers. Also, the information available for sharing includes product quality information, new delivery information, etc.

As information technology continues to evolve, information sharing has also become faster and more efficient[2]. However, information asymmetries persist, and the risks they pose remain insurmountable. Each enterprise within the supply chain has its ideas about operational mechanisms, so the objectives often conflict with those of the supply chain as a whole. Low visibility of information between companies will lead to a waste of resources and underneath the overall efficiency of the supply chain. The management of uncertainty risks and coordination mechanisms have become essential breakthroughs in the optimization of supply chain systems[3]. They are reducing uncertainty through information sharing to promote closer strategic coordination and cooperation to jointly address the challenges to supply chains posed by information asymmetry and the risk of uncertainty.

The main purpose of manufacturers outsourcing some components to upstream suppliers is to minimize the costs associated with maintaining product lines, since many of these components are too costly while in low demand[4-5]. Outsourcing production can increase production integration and reduce overall cost. In reality, however, sometimes outsourcing does not reduce costs, but rather could lead to cost increase[6]. This is because outsourcing creates a decentralized supply chain, where suppliers and manufacturers are financially independent. Therefore, they both seek their best interests. On this basis, both parties tend not to share private information before come into a cooperation plan, as any sharing of private information may result in losing some of its bargaining power[7], which is not conducive to maximizing its benefits.

In this paper, manufacturers with greater bargaining power are faced with a number of factors to consider when developing a coordination strategy for outsourcing production. First, manufacturers tend to obtain accurate private supplier information, i.e., information on cost structure, product quality, etc., in order to keep the price paid as low as possible in order to obtain a greater profit. At the same time, manufacturers should also consider whether suppliers will report false information, which may result in additional cost. Outsourced, decentralized supply chain reduces transparency, and asymmetries in cost information ultimately reduce manufacturer profitability. It is therefore particularly important to establish contractual design mechanisms in such supply chain that facilitate collaboration between the parties and reduce the impact of information asymmetries.

The conflict of interest between suppliers and manufacturer belongs to the ex ante asymmetric information game, which satisfies the reverse choice model in Principal-agent Theory. The manufacturer is the client and has greater bargaining power, so that manufacturer only needs to offer contracts from its own point of view, without further negotiation with the supplier; Suppliers are agents and have information about production costs, production quality, etc, which is unknown to the manufacturer. Manufacturer provides a list of contracts on quantities to be purchased and price to be paid, based on a subjective judgment of the supplier's cost structure, and the supplier decides whether accept this contract or not to begin production cooperation. This paper applies the theory of mechanism design to provide manufacturers with contract design solutions. This paper will focus on how a downstream manufacturer, facing with uncertain cost information, can overcome conflicts of interest between the parties and design ideal contract models.

2. Modeling Framework

We consider a two-echelon supply chain system with n suppliers (she) and 1 manufacturer (he). Manufacturer

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procures component from suppliers in order to assemble final products. Each final product requires *one* component from each supplier. Suppliers are irreplaceable from each other. Manufacturer pays after receiving goods.

Supply chain faces uncertain market demand D, and the final product can be sold at fixed price r. We assume supplier i incurs a unit production cost c_i, i=1,...n, which is private information for the supplier only. The manufacturer only has a subjective assessment about each supplier's cost.

Manufacturer believes cost from each supplier falls into c_i^H (high type) or c_i^L (low type), with a *joint* probability of $P(c_i = c_i^{t_i}, \forall i = 1,...,n, t_i = H, L)$ and $c_i^H \geq c_i^L$, the probability density function is $p_i^k = P(c_i = c_i^k), k = H, L, \forall i = 1,...,n, p_i^H + p_i^L = 1$. We assume the sum of components' cost no greater than final product price,i.e., $\sum_{i=1}^{n} c_i^H < r$ in order to guarantee manufacturer's profitability.

According to the principle of mechanism design, manufacturer maximizes his profit by providing optimal menu of contracts to each supplier[8]. Based on revelation principle, contracts offered by manufacturer should be incentive compatible. For each supplier has two types of cost, manufacturer offers two separate contracts, $(Q_i^H, X_i^H), (Q_i^L, X_i^L)$. If supplier i with $c_i = c_i^{t_i} (t_i = H, L)$ chooses contract (Q_i^k, X_i^K), where k=L,H, then she agrees to produce and deliver Q_i^k units of his component to the manufacturer in return for a total payment of X_i^k. Supplier i's profit is $X_i^k - c_i^{t_i} Q_i^k$. After manufacturer realizes actual demand, he assembles components into final product and satisfy the market as far as he can[9].

Manufacturer's problem can be formulated into the following model:

$$\max_{\substack{(X_i^H, Q_i^H), (X_i^L, Q_i^L) \\ i=1,...,n}} \Pi = E_D\{\sum_{\substack{t_i = H, L \\ i=1,...,n}} P(c_i = c_i^{t_i}, \forall i = 1,...,n)[r \min(Q_1^{t_1},...,Q_n^{t_n}, D) - \sum_{i=1}^{n} X_i^{t_i}]\} \tag{1}$$

$$s.t. = \begin{cases} (I.C.High) X_i^H - c_i^H Q_i^H \geq X_i^L - c_i^H Q_i^L, i = 1,...,n \\ (I.C.Low) X_i^L - c_i^L Q_i^L \geq X_i^H - c_i^L Q_i^H, i = 1,...,n \\ (I.R.High) X_i^H - c_i^H Q_i^H \geq 0, i = 1,...,n \\ (I.R.Low) X_i^L - c_i^L Q_i^L \geq 0, i = 1,...,n \end{cases}$$

While each supplier has two potential contracts, manufacturer has 2^n possible revenue outcome. For instance, when there's two supplier (n=2), manufacturer's profit function Π can be written as follows:

$$\begin{aligned} \Pi = \ & \mathrm{E}\{P(c_1 = c_1^H, c_2 = c_2^H)[rmin(Q_1^H, Q_2^H, D) - x_1^H - x_2^H] \\ & + P(c_1 = c_1^H, c_2 = c_2^L)[rmin(Q_1^H, Q_2^L, D) - x_1^H - x_2^L] \\ & + P(c_1 = c_1^L, c_2 = c_2^H)[rmin(Q_1^L, Q_2^H, D) - x_1^L - x_2^H] \\ & + P(c_1 = c_1^L, c_2 = c_2^L)[rmin(Q_1^L, Q_2^L, D) - x_1^L - x_2^L]\} \end{aligned} \tag{2}$$

There are 4n constraints for this model. Incentive Compatibility constraints $(I.C.High), (I.C.Low)$ ensure each supplier choose optimal contract based on their true cost type. Individual Rationality Constraints $(I.R.High), (I.R.Low)$ ensures supplier can have non-negative profit, which prevents interruption of cooperation.

3. Contract design under different information transparency

3.1 Benchmark: symmetric cost information

Under symmetric information, the cost type would be revealed to manufacturer and supplier herself simultaneously. Therefore, manufacturer could know supplier i's cost t_i precisely, and provides her with contract $(Q_i^{t_i}, X_i^{t_i})$, supplier can either accept this contract or reject it. Hence, the incentive compatibility constraints no longer exist. For given realization of supplier's costs, i,e., $c_i = c_i^{t_i}, \forall i = 1,...,n$, the manufacturer's problem writes as follows:

$$max\tilde{\pi}(Q_i^{t_i}, X_i^{t_i}) = r\mathrm{E}min(Q_1^{t_1},...,Q_n^{t_n}, D) - \sum_{i=1}^{n} X_i^{t_i} \tag{3}$$

$$s.t.(I.R.) X_i^{t_i} - c_i^{t_i} Q_i^{t_i} \geq 0, \forall i = 1,...,n$$

Manufacturer's revenue function $\tilde{\pi}$ decreases while $X_i^{t_i}$ increase, therefore manufacturer obtains maximum revenue when $X_i^{t_i} = c_i^{t_i} Q_i^{t_i}$. The function can be reformulated as

$$max\tilde{\pi}(Q_i^{t_i}, X_i^{t_i}) = r\mathrm{E}min(Q_1^{t_1},...,Q_n^{t_n}, D) - \sum_{i=1}^{n} c_i^{t_i} Q_i^{t_i}$$

It can be observed that manufacturer profit is restricted by minimum procurement quantity from suppliers. Thus the manufacturer would procure the exact same quantity of each components from suppliers, i.e. $Q_1^{t_1} = ... = Q_n^{t_n} = Q$. We derive the function and it is straightforward to show the following result:

Lemma 1 For any given $c_i = c_i^{t_i}, i = 1,...,n$, the manufacturer's optimal contract is

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$$\forall i = 1,...,n, Q_i^{t_i} = \bar{F}^{-1}(\frac{\sum_{i=1}^{n} c_i^{t_i}}{r}), X_i^{t_i} = c_i^{t_i} Q_i^{t_i}$$

Suppliers always get zero profit under symmetric information, and the manufacturer captures entire profit. The expected optimal profit function is

$$\tilde{\Pi} = \sum_{\substack{t_i=H,L \\ i=1,...,n}} P(c_i = c_i^{t_i}, \forall i = 1,...,n)\tilde{\pi}(Q_i^{t_i}, X_i^{t_i}) \tag{4}$$

3.2 Asymmetric cost information

In this section, we continue to design the list of contracts under asymmetric cost information. According to standard analysis for mechanism design problems, we can show that constraints (*I.R.High*) and (*I.C.Low*) must be binding at optimality, i.e.,

$$X_i^H = c_i^H Q_i^H \tag{5}$$

$$X_i^L = Q_i^H (c_i^H - c_i^L) + c_i^L Q_i^L \tag{6}$$

Furthermore, it follows that (*I.C.Low*), $c_i^H \geq c_i^L$, and (*I.R.High*) that constraint (*I.R.Low*) is redundant. Substituting X_i^H and X_i^L above into (*I.C.High*), it follows directly that (*I.C.High*) is automatically satisfied if $Q_i^H \leq Q_i^L, \forall i = 1,...,n$. The manufacturer's problem given by (1) reduces to the following problem

$$\max_{\substack{Q_i^H, Q_i^L \\ i=1,...,n}} \Pi = \sum_{\substack{i=1,...,n \\ t_i=H,L}} [P(c_i = c_i^{t_i}, \forall i = 1,...,n) r \mathrm{E}\min(Q_1^{t_1},...,Q_n^{t_n}, D)] - \sum_{i=1}^{n}(c_i^H - p_i^L c_i^L)Q_i^H - \sum_{i=1}^{n} p_i^L c_i^L Q_i^L \tag{7}$$

subject to

$$Q_i^H \leq Q_i^L, i = 1,...,n$$

We denote $\vec{Q} = ((Q_1^H, Q_1^L),...,(Q_n^H, Q_n^L))$ as the optimal solution to problem (7).

3.2.1 1-Supplier Situation

We first solve a simple case of *n*=1, which means there exists only one supplier. The partial derivative of Q_1^H and Q_1^L from the manufacturer's profit function can be written as follows

$$\frac{\partial \Pi}{\partial Q_1^H} = p_1^H r\bar{F}(Q_1^H) - (c_1^H - p_1^L c_1^L)$$

$$\frac{\partial \Pi}{\partial Q_1^L} = p_1^L r\bar{F}(Q_1^L) - p_1^L c_1^L$$

Manufacturer's revenue would decrease while order quantities increase, because $\bar{F}$ is a non-increasing function. Under the low-cost type, the manufacturer's optimal procurement quantity is $Q_1^L = \bar{F}^{-1}(\frac{c_1^L}{r})$. When the cost type is high, the optimal procurement quantity is $Q_1^H = \bar{F}^{-1}(\frac{c_1^H - p_1^L c_1^L}{p_1^H r})$ if $c_1^H - p_1^L c_1^L < p_1^H r$ is satisfied. Or else, $Q_1^H = 0$.

3.2.2 N-Suppliers Situation

We expand the scale of supplier from 1 to *n*. First, we define high cost type procurement quantity for each supplier *i* as:

$$q_i^0 \overset{def}{=} \begin{cases} \bar{F}^{-1}(\frac{c_i^H - p_i^L c_i^L}{p_i^H r}), c_i^H - p_i^L c_i^L < p_i^H r \\ 0, otherwise \end{cases}$$

Recall that q_i^0 is supplier *i*'s optimal production quantity if supplier *i* is a sole supplier in the system and the cost type is high. Without loss of generality, we number the suppliers such that

$$q_1^0 \leq q_2^0 \leq ... \leq q_n^0 \tag{8}$$

We can now present an theorem as follows

Theorem 1 The optimal solution to problem (7) satisfies

$$Q_1^H \leq Q_2^H \leq ... \leq Q_n^H \leq Q_1^L = Q_2^L = ... = Q_n^L$$

We define $Q^L = Q_j^L, \forall j = 1,...,n$.

Theorem 1 provides with an important feature for problem solving, for it reduces variable amount from 2*n* to *n*+1.

For notation convenience, for $1 \leq i \leq j \leq n+1$, we define

$$\alpha_{i,j} \overset{def}{=} \begin{cases} \sum_{d=i}^{j}(c_d^H - p_d^L c_d^L), if j \leq n \\ \sum_{d=1}^{i-1} p_d^L c_d^L + \sum_{d=i}^{n} c_d^H, if j = n+1 \end{cases} \tag{9}$$

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$$\beta_{i,j} \overset{def}{=} \begin{cases} P(c_b = c_b^L, \forall 1 \le b \le i-1) - P(c_b = c_b^L, \forall 1 \le b \le j), iff \le n \\ P(c_b = c_b^L, \forall 1 \le b \le i-1), iff = n+1 \end{cases} \tag{10}$$

We are able to decompose the problem (7) into a summation of *n*+1 functions with a single variable as follows:

Lemma 2 Problem (7) is equivalent to the following problem:

$$\max_{0 \le Q_1^H \le Q_2^H \le \ldots \le Q_{n+1}^H} \sum_{i=1}^{n+1} M_{i,i}\left(Q_i^H\right) \tag{11}$$

where $Q_{n+1}^H \overset{def}{=} Q^L$ and

$$M_{i,i}(Q) \overset{def}{=} r\beta_{i,i} \int_0^Q \overline{F}(x)dx - \alpha_{i,i}Q \tag{12}$$

Further study on $M_{i,i}(Q)$ enables us to establish the following result:

Lemma 3 $\forall i, j, 1 \le i \le j \le n+1$, we define functions

$$M_{i,j}(Q) \overset{def}{=} r\beta_{i,j} \int_0^Q \overline{F}(x)dx - \alpha_{i,j}Q \tag{13}$$

$M_{i,j}(Q) = \sum_{d=i}^{j} M_{d,d}(Q)$. $M_{i,j}(Q)$ reaches its maximum at $Q_{i,j}^*$ where if $1 \le j \le n$, then

$$Q_{i,j}^* = \begin{cases} \overline{F}^{-1}\left(\frac{\alpha_{i,j}}{r\beta_{i,j}}\right), if\ \alpha_{i,j} < r\beta_{i,j} \\ 0, otherwise \end{cases}$$

3.2.3 Algorithm Design

We design an specific algorithm to solve this problem. It can be proved that $Q_1^H < Q_2^H < \ldots < Q_n^H < Q_{n+1}^H = Q^L$ is a sufficient condition for optimal solution, i.e., the manufacturer would ask all the suppliers to produce different amount of components when their cost type is high, which are strictly lower than their low costs quantity. When sufficient condition is violated, some neighboring suppliers would produce same amount of product. Thus, the optimal solution to problem (7) can be generally caracterized as a *m*-group solution, $m \le n$.

For each solution group, we denote the head pointer and tail pointer for each group as $l_i, u_i, \forall i = 1, \ldots, m$. Therefore, $l_1 = 1, l_i \le u_i, l_i = u_i - 1 + 1, u_m = n+1$. Suppliers in the same group has identical high cost procurement quantity, that is

$$Q_{l_i,u_i}^* = Q_k^H, \forall l_i \le k \le u_i$$

We initially put each Q_i^H into a separate group, so we have $m = n+1$ groups. If $Q_{l_i,u_i}^* < Q_{l_{i+1},u_{i+1}}^*$ is satisfied for all $i = 1, \ldots, m-1$, then we reach a unique solution. The algorithm is formalized below:

Algorithm 1 Finding the optimal solution to problem (7)

STEP 1: Initialization. Denote $m = n+1, l_i = i, u_i = i$.

STEP 2: Compute optimal procurement quantity $Q_{l_{i+1},u_{i+1}}^*$ for each group

STEP 3: Traversal and Numerical correction. $IF Q_{l_i,u_i}^* < Q_{li+1,u_{i+1}}^*, \forall i = 1, \ldots, m-1, THEN Q_k^H = Q_{l_i,u_i}^*$. OTHERWISE:

- let *k* be the smallest index *i* which satisties $Q_{l_i,u_i}^* \ge Q_{l_{i+1},u_{i+1}}^*$. We merge group *k* and group *k*+1.
- $u_k \leftarrow u_{k+1}$
- $l_j \leftarrow l_{j+1}, u_j \leftarrow u_{j+1}, j = k+1, \ldots, m-1$
- $m \leftarrow m-1$

This algorithm significantly reduces the complexity to $o(n)$ from which the original problem is $o(2^n)$. That means the manufacturer's problem can be solved under linear time complexity.

The main reason for the reduction of problem complexity is that theorem 1 guarantees suppliers is well arranged based on their optimal *1-supplier procurement quantity*. We combine algorithm above with supplier's profit function, and the simplified function can be written as follows:

$$\Pi_i^H = 0, \forall i = 1, \ldots, n \quad \Pi_i^L = Q_i^H(c_i^H - c_i^L), \forall i = 1, \ldots, n$$

Under cost information asymmetry, high cost suppliers $i(i = 1, \ldots, n)(c_i = c_i^H)$ always generate zero profit, whereas low cost suppliers could have positive gains. Meanwhile, low cost suppliers' final profits depend on their high cost order quantity and difference between two cost types.

4. Parameter Analysis

In this section, we study the impact of market demand and final product price on manufacturer's profit function, which leads to the value of cost information assessment. We define manufacturer's information value as $V = \tilde{\Pi} - \Pi$. Because manufacturer acquires full profit under symmetric information, $\Pi < \tilde{\Pi}$. Profit function for each supplier *i* is $V_i = -\Pi_i = -p_i^L \Pi_i^L$, Π_i is supplier's *ex ante* profit. Supply chain's information value is denoted as $V_T = V + \sum_{i=1}^{n} V_i$.

4.1 Market Demand

We first analyze how market demand distribution affect

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the optimal contract. We assume the demand follows a normal distribution, i.e., $D \sim N(\mu,\sigma)$. The probability of demand being negative is negligible, thus $\mu >> \sigma > 0$. We derive the following results regarding the change of average demand, .

Proposition 1 If $D \sim (\mu,\sigma)$, then

- $\mathbf{\Pi}$ and $\tilde{\mathbf{\Pi}}$ are increasing in μ.
- V, V_T and $\mathbf{\Pi}_i, \forall i = 1,...,n$ are increasing in μ.

It can be interpreted as follows. First, demand expansion would increase supplier's order quantity. $\forall i = 1,...,n$, Q_i^H and $Q_i^L = Q^L$ constantly increase when μ increases. Under asymmetric information, if average market demand increases, manufacturer would definitely urge suppliers to produce more components. Suppliers' profit would also increase because $\Pi_i = p_i^L \Pi_i^L = p_i^L Q_i^H (c_i^H - c_i^L), \forall i = 1,...,n$. Higher average demand generates more information rent for suppliers.

Second, manufacturer's profit would also increase. Manufacturers can earn greater profits in the face of higher market demand in both the symmetric and asymmetric information scenarios. With symmetric information, the manufacturer captures all benefits in the supply chain, so its profits must increase as the market demand increases. Under asymmetric information, more sales volume also leads to higher returns. Still, manufacturers need to pay more information rent for suppliers, so the yields to manufacturers under asymmetric information rise less with average demand than under symmetric information.

Third, information value for whole supply chain would increase. Suppliers acquire higher information rent while information value increases even faster for manufacturer. Thus, the total information value increases.

4.2 Final Product Price

Assume manufacturer sales the product at price $\hat{r}$, which is increased from r, when other factors remain the same. According to high cost order quantity $q_i^0 = \bar{F}^{-1}(\frac{c_i^H - p_i^L c_i^L}{p_i^H r})$ each supplier increases their order quantity when final price increases, $q_k^0 \le \hat{q}_k^0, k = 1,...,n$. Therefore, we have $\hat{Q}_{n+1}^H = \hat{Q}^L \ge Q^L = \{Q_{n+1}^H$. We can have the following result:

$$\Pi(Q_1^H,...,Q_{n+1}^H \mid \hat{r}) \overset{\hat{r}>r}{\ge} \Pi(Q_1^H,...,Q_{n+1}^H \mid r) = \mathbf{\Pi}$$

We can prove that $\tilde{\mathbf{\Pi}} \ge \mathbf{\Pi}$.*Similarly*, $\hat{\tilde{\mathbf{\Pi}}} \ge \tilde{\mathbf{\Pi}}$. It can be interpreted as follows: First, When the selling price of the final product increases, manufacturers will expect suppliers to make more parts because at that point the expected loss from out-of-stocks increases, and the unit storage costs from inventory backlogs remain unchanged.

At higher unit product prices, both in the case of information symmetry and in the case of information asymmetry, the manufacturer's marginal returns increase, and thus the returns under the manufacturer's optimal contract.

At the same time, when the selling price of a product raises, the manufacturer's earnings are raised more under symmetric information than under asymmetric information, because the manufacturer always gets the full benefit of the supply chain.

5. Conclusion

In order to reduce costs and increase revenues, many companies in the industrial sector will try to transform themselves into manufacturers who are only responsible for final assembly and outsource the production of components to upstream suppliers. The transformation of such business functions has gradually become a trend in the transformation of MNCs. However, upstream suppliers are often reluctant to work very deeply with suppliers due to their financial and target independence from the manufacturer, so manufacturers often incur additional costs in contracting to ensure that contracts run smoothly. This additional expenditure is the main objective of the study in this paper. In this paper's hypothesis, suppliers have full knowledge of their cost structure as private information, while downstream manufacturers only have subjective judgments about their cost structure and do not know accurate information.

The idea behind this paper's solution to information asymmetry is to design a contracting approach for manufacturers, in which manufacturers gain maximum benefit by giving suppliers a menu of contracts to choose from to understand the types of costs to suppliers. The contract menu presented in this article contains two parameters, the quantity purchased and the price paid by designing efficient algorithms to solve the contract menu for each vendor in an ideal state. By applying the contract menu design approach in this article, companies can effectively reduce unnecessary costs in supply chain collaboration and increase their revenue.

By analyzing the model parameters, this paper has further explored the specific impact that contract design solutions can have on the overall effectiveness of the supply chain under cost information asymmetry. For example, when market demand increases or when the selling price of a final product increases, information about a supplier's cost structure becomes more valuable to the manufacturer, and therefore the manufacturer is more motivated to obtain specific information about the supplier's cost structure.

This paper examines the deficiencies in contract de-

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sign mechanisms for manufacturers facing upstream information asymmetry. Information types will be further expanded in future studies. First, assumptions made in this paper about the types of supplier costs are based on discrete distributions, and future research can further make assumptions about different distributions to match the realities of the firm more closely. Second, this paper assumes that suppliers can fully meet manufacturers' ordering needs without considering the potential for supply disruptions in the event of unknown supply chain risks. The next study will further introduce supply disruption risk as a consideration in order to investigate the supply chain robustness approach. Finally, this paper focuses on the cost structure of production as a manufacturer contract design strategy under private information, and the mechanisms by which other different types of information influence manufacturer contract design can be further studied in the future.

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Research on the Future Trend of New Retail and E-commerce

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ABSTRACT

In the rapid development of information technology, the term new retail was derived based on online shopping, and as the creator of largest online shopping platform in China, Ma Yun, made a related concept discussion on new retail, which caused a great response in the whole society. Therefore, this paper will study the future development trend of the new retail model, as well as the controversy existing in the new retail itself and many successful cases. Through analysis and discussion, the paper will discuss the future development of new retail and e-commerce trends.

1. Introduction

In the rapid development of information technology and Internet technology, China's big data technology, artificial intelligence and block chain technology innovation speed is very fast. For online transactions based on the network environment, it has promoted the innovation and development of new business forms and trading methods. Although in the past period of time, the network, that is, online platform, has developed very fast, the integration of the construction platform and offline platform is the mainstream and development trend of the future. Through the understanding of the creators of many online shopping platforms, the combination of online and offline is also the mainstream of future development, and a lot of energy has been invested in the work of combining online and offline.

2. New Retail Overview

2.1 New Retail Concept

The concept of new retail is put forward by Ma Yun at the Yunqi Conference held in October 2016, that is, in the future shopping process, the retail model will gradually change to a combination of online and offline, while logistics provides assistance to achieve new retail. The combination of the three can achieve a real new retail. Because in the past development process, online platform construction and sales model have had a strong impact on the traditional offline sales, and the current trend of combining online and offline has made the retail industry transformation work in the entire Internet era with a specific direction, so that the whole Internet era of retail reform work has a specific direction, it is also feasible. The characteristics of the new retail is the combination of online and offline. In the process of gradual

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integration, there is a fusion state in which you have me and I have you[1].

2.2 Breakthrough in Physical Retail

Since the emergence of online shopping platforms, the development of the real retail industry in China can be described as mixed. On the one hand, the number of closed stores such as major department stores and some shopping malls has greatly increased, while the performance of daily operations has continued to decline. On the other hand, some industries are constantly seeking to transform and upgrade under the impact of new fields and new models. Especially with the new retail concept put forward by Ma Yunqi at the 2016 Yunqi conference, both physical retail and online retail are beginning to think about whether or not, as Ma Yun said, e-commerce will form the mode of online and offline integration with logistics in the coming decades.[2].

In a survey of traditional retail sales data in 2016, it was found that layoffs and closures were frequent in supermarkets and department stores. In related reports issued by third parties, 67% of department stores and supermarkets showed a decline in both company revenue and net profit in the first half of 2016. And the development of this phenomenon has not been significantly improved so far, so it can be considered that the current online growth is weak, and offline need online data to transform its sales model, so the organic integration between the two will be a very favorable measure, which will have a very positive impact on the retail industry. The main thing is that the current technological innovation, which makes the realization of new retailing more reliable, supports the rapid development of the Internet and the rapid progress of information technology and intelligent technology, making the application of scientific and technological means more and more extensive in the retail industry [3].

2.3 The Real Online and Offline Integration Has Not Yet Been Achieved

Although the combination of online and offline is an inevitable trend for the retail industry, and has been promoted gradually, but based on the current social development background and technology development background, although many e-commerce giants have carried out layouts and made some progress, there still have not formed a real integration between online and offline. For traditional stores and supermarkets, they already have a large and systematic team and operation model, in the process of integrating the online sales model into the offline sales system, there is a great contradiction between them, and there are also conflicts of interest. So through the new way of thinking to carry out the operation of offline supermarkets, although it is innovative, the actual implementation is not satisfactory. Especially in the process of offline expansion, because of the need to establish new stores and recruit new talents and teams to operate, there are great difficulties in the process of site decoration and talent selection.

For e-commerce brands, in the process of seeking online and offline integration, the most choice is to open offline stores. Taking many hot brands on Taobao as an example, the three squirrels, membrane family and Yu Ni Fang, etc., in addition to selling on the online platform, also set up offline physical stores in many crowded cities and regions. Because of the traffic and visibility provided by the online platform, the gains from the offline physical stores opened are very significant. In addition to Taobao, other network platforms, including JingDong, Dangdang and Jumei, etc., some powerful and hot-selling brands have already carried out similar physical store layout offline. For these online hot selling brands, their own popularity is relatively high, so there is no need to worry about the flow problem in actual sales, but at the same time, the same problems as the traditional retail industry are the location of the decoration and the choice of supply chain. There are many online hot selling brands on the opening of physical stores have encountered these problems.

2.4 Reflections on New Retail and Traditional Retail

From the perspective of traditional retailers, although new retail has brought impact and influence to the traditional retail industry, it also means that the value reconstruction of the traditional retail industry has come. After analysis by some Chinese chain experts, it was concluded that in the future development process, traditional retail will move towards “big” and “small” -- two-pole direction. The so-called “big” refers to large-scale shopping mall that combines entertainment, leisure and consumption. This conclusion is not unfounded, because there are nearly 1,000 large and medium-sized commercial projects in China’s current large and medium-sized cities, including Big-name supermarkets such as Wanda square and Outlets. The “small” refers to convenience stores, because the consumption of people with credit is constantly upgrading, and the urban residents of the demographic changes, so the demand for convenience has become more and more prominent. For the new after-sales industry, based on convenience stores to expand

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and cover the new retail industry is a very important model. JD President Qiangdong Liu, in his speech and planning for corporate strategy, announced that within the next five years JD would open more than 1 million convenience stores in Chinese cities.

Thinking about the future development from the perspective of new retail, the most important change in the development process is to optimize the service. Because compared to the traditional retail industry, services in the online sales process are mainly reflected in pre-sales and after-sales, and lack of intermediate communication links, so in the process of shifting to offline sales, more optimization of service content and service methods is required. In combination with the actual needs of consumers, as well as consumer pain points in the process of consumption, when these problems are solved, the value of the new retail industry will increase, and for the development of the entire retail industry, real changes will occur.

3. Future Trends in the New Retail Industry

The future development trends of the new retail industry are mainly: the importance of supply chain protruding, the number of consumers based on membership system growth, the seamless connection between online and offline, and the rapid development of home decoration and beauty makeup industry.

3.1 The Importance of the Supply Chain Is Highlighted

Because in the early development process, the retail industry has not been greatly impacted and affected, so the attention of retailers themselves to the supply chain is the supply chain cost in the production cycle. And the impact of the new retail industry on the supply chain has gradually shifted to the agility of the supply chain itself. Because for the new retail industry that combines online and offline, the higher the agility of the supply chain itself, then compared with similar products and competitors themselves, the advantage position in the process of product sales and marketing will be higher. It is more beneficial to the development of the enterprise itself under the fierce competition environment. Therefore, in the future development of the new retail industry, to a large extent, the supply chain itself agility issues will be paid more and more attention.

3.2 Increase in the Number of Consumers Based on the Membership System

Because compared to individual customers, member customers belong to a fixed consumer group for offline physical stores. In the actual consumption process, the frequency of coming to the store is higher, and the actual expenditure of multiple consumption will also be more. Most of the profits of the physical store itself come from these members. For example, under the impact of the new retail industry, Macy's has constructed a new membership system for the entire department store. Some members with very high consumption will have 5% cashback after the consumption limit reaches a certain upper limit on the same day. Through this new construction of the membership system to stimulate consumption, Macy's membership accounted for 50% of the company's total revenue after the system rectification, and the number of members in the class is also increasing. Therefore, for the new retail industry based on the combination of online and offline, many non-member customers in the past need to be converted into member customers, even if this part of converted customers is only 1% of non-member customers, but The profit brought by it is unmatched by those 99% of non-member customers

3.3 Seamless Online and Offline Connections

Since online and offline began to combine and influence each other, consumers themselves in the process of consumption more and more like to place orders online and take orders offline. For the retailer itself, this kind of purchase method also reduces the cost input in the distribution process, and also enables consumers to enter the store for consultation and consumption, and the traffic of the physical store becomes greater. With the passage of time, online orders and offline pick-up shopping method have become the choice of more and more people.

3.4 The Rapid Development of Home Improvement and Beauty Industry

For many retailers, after the emergence of online and offline integration of the new retail industry, through the comparison and research of the data, it is found that the sales of the two categories of Home improvement and Beauty under the impact of the new retail industry are much higher than the pure offline sales development level before. In the traditional retail industry, clothing is a well-deserved sales hegemony, and in the new retail industry model, home improvement and beauty developing faster than clothing. Home improvement services include not only traditional home decoration, but also pet supplies and garden supplies, which are in high demand today, are included in the content of home improvement

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services. And in the future, as people continue to improve the quality of life, the speed of home improvement services will continue to increase. The same is true of the beauty industry, people's pursuit of beauty and their own quality of life requirements will become higher and higher in the process of continuous development, so people will invest more and more in life, dress and beauty

4. Conclusion

To sum up, the author makes a comprehensive analysis of new retail in this paper, hoping to give readers some inspiration. For the development of e-commerce and new retail, with the improvement of people's living standards and the pursuit of life in the future, the consumption concept and quality of daily life will be improved. Therefore, the new retail industry derived from the combination of online and offline will receive more and more attention in the future, and with the rapid development of information technology and Internet technology, the relationship between e-commerce and the new retail industry will become closer and closer, which will bring about great changes for the entire sales industry and online shopping platforms.

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Optimization of the Financial Strategy of Bilibili Barrage Website from the Perspective of Social Responsibility

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ABSTRACT

This paper studies the modern corporate financial strategy from the perspective of corporate social responsibility performance, using the Internet video site Bilibili as an example to analyze, starting with Bilibili's strategic environment, based on financing, investment, distribution, and social responsibility. This paper comprehensively analyzes its advantages and disadvantages from its financial strategy. Finally, from the perspective of social responsibility, from three aspects of investment, financing, and profit distribution, the authors made optimization suggestions for Bilibili's financial strategy.

1. Introduction

This paper takes bilibili, a video website in the Internet industry (English name: Bilibili, hereinafter referred to as B Station), starting from the introduction of the existing financial strategy analysis of Station B, this paper combines the perspective of corporate social responsibility and analyzes the performance of social responsibility of Station B from the perspective of stakeholders.

2. Financial Strategy Analysis of Station B

Different from other video websites at present, B station has a unique "UP main +OGV" mode, forming a good ecosystem of original content. From the investment trend of B station in recent years, it is not difficult to see that On the basis of retaining the core users of the original quadratic element, B station strives to attract non-quadratic culture enthusiasts with multiple partitions such as live broadcast and film and television [1].

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2.1 Financing Channels and Financing Scale

The financing method of B station at the present stage is equity financing. After three years of venture capital from 2015 to 2017, the company went public with its IPO on March 28, 2018, and then went through four rounds of strategic financing. According to data, Tencent investment has paid close attention to B station in 2015, and in 2019 Tencent announced that it will cooperate with B station in the future.

In 2018, B Station took advantage of the "Dongfeng" of its listing to expand its financing scale.In October 2018, Tencent announced an investment of 317 million US dollars in B Station to increase its stake to around 12%. On February 13, 2020, Tencent again invested in B Station to increase its stake to 18%; In February 2019, Alibaba announced about 24 million shares, holding about 8% of the shares; On April 9, 2020, SONY announced a strategic investment of $400 million in B station, and the two sides will carry out in-depth cooperation in various fields.

2.2 Investment Direction and Scale

In recent years, Station B has invested in production of Chinese opera, game agency, live broadcast of e-sports and documentary. The large investment behaviors of B Station in recent years are mainly after 2016. As Chen Rui, CEO of B Station, said: Station B needs to "get out of the loop". If Station B wants to establish a firm foothold in the future video website industry, it should not be limited to the positioning of a small circle with the same two dimensions. We need to transform into a benign ecological community that is based on two-dimension culture and supplemented by popular Internet "we media". Under the large investment scale, the operating cash flow of B station is not optimistic. During the expansion period, it is normal for enterprises to frantically absorb funds for development. However, Station B is obviously hungry for funds, and its operating cash flow is only enough to "feed the family", with low risk prevention and control capability for emergencies. Encouragingly, since 2017, the cash flow from operating activities of Station B has been positive, which reflects the certain effect of investment from the side.

2.3 Investment Effect and Dividend Distribution Strategy Analysis

The return on total assets of Station B from 2015 to 2018 is not very optimistic. In 2016, the exclusive agent of B station mobile game "Fate/Grand Order" national service, the overall rate of return has improved, after which B station launched a series of subsequent investments. From 2019 to 2020 Station B also focuses on investing in opera production. Although it has not been reported in the financial report, it can be expected that the operation managers of station B continue to explore new profit models while maintaining good user experience [2].After B station went public in 2018, it attracted a lot of investment. At present, there is no public dividend distribution plan for B station. It can be seen from the phenomenon that many big capital have settled in B station in the hope of joining the "ship full of young people", That B station is a very promising new video website in the eyes of many domestic Internet capital. But the gap in B's dividend distribution will affect the confidence of injected capital in the future.

3. Analysis of Social Responsibility Performance in the Current Financial Strategy of Station B

This part will analyze whether the corporate social responsibility fulfilled by B station is in place from the perspective of its stakeholders and in combination with its financial strategy. Stakeholders are divided into internal and external stakeholders. The analysis objects of internal stakeholders are mainly shareholders and employees, while the analysis objects of external stakeholders are mainly consumers and social environment.

3.1 To Internal Stakeholders

From the perspective of shareholders, the data show that the return on equity of B station over the past 12 months is -18.41%. The biggest problem of Station B at the present stage is the serious net loss, which is like a "bottomless hole", and it is impossible to make a stable dividend plan. At the same time, due to the lack of profit points, B's profitability is also worrying. Although it is a promising new video site with investments from Tencent, Alibaba and SONY, it still needs to strengthen its performance of shareholder responsibilities. From the perspective of employees, low profitability leads to low wages for employees, which is the dilemma facing Station B at this stage. For B station at the present stage, the problem of not making profits makes it the basic responsibility in social responsibility. The problem of not making profits makes its basic responsibility in social responsibility -- economic responsibility is barely fulfilled. The problem that the salary of employees is not competitive in the same industry will lead to the lack of talents in the later stage.

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3.2 To External Stakeholders

From the perspective of consumers, besides the 2-dimensional culture with danmu culture as the core competitiveness, the absence of patch advertising is also an important aggregation point of users. The choice of B station to give up the AD revenue to maintain the user experience itself is a respect for consumers, but also give up the traditional AD as the main profit point. In fact, in the previous analysis, we can also see that the lack of profit point is the main contradiction at the current stage of B station. Although Station B maintains the in-station setting without AD placement, if it cannot find a new profit model as soon as possible, it will be difficult to maintain the in-station construction and bring consumers a good video website viewing experience in the case of continuous loss[3].Even so, Station B still adheres to the attitude of being responsible to consumers to build community culture in the station. In the process of multi-investment in B station, some users who do not belong to the two-dimensional culture circle also enter into the community. How to balance the interest circle between new users and old users is also what B station has been trying to explore. From the perspective of social environment, the core users of B station are urban young people under the age of 28. How to correctly guide the values of youth, spread positive energy, and strengthen content review? Users in B station can apply to become "discipline committee member" to maintain danmu etiquette spontaneously from the user end. In the face of difficulties, No matter making donations to the epidemic area or offering free membership to the people of the epidemic area, Station B did not evade its ethical and philanthropic responsibilities because of its problems in profitability and return on investment.

3.3 Financial Strategy Analysis of Station B

As an emerging video website, B station has achieved good results in its early stage of development. However, from the analysis of financing, investment and distribution in its financial strategy, it does have some problems in cost, revenue and investment ideas.

3.3.1 High Costs Affect Sustainable Development

From 2018 to 2020, the users of B station are surging, which brings strong server pressure, huge hardware maintenance costs and software development costs, which has become a reason for B station's poor performance in recent financial statements. Secondly, B station is mainly about 2-dimensional culture, and the annual copyright expense is also a large sum of money. In 2014, B station put forward the "Xin-Fan Contract Plan", in which users can voluntarily pay rewards to their favorite TV series, but the huge copyright fee is only a drop in the ocean[4].Finally, the cost of acquiring effective users in the video website industry is soaring, and in the face of the gradual inefficiency of traditional marketing means of acquiring users, whether B station can find a new marketing method is also the focus of cost saving.

3.3.2 A Single Revenue Structure, Mired in a "Bottomless Pit of Money"

Singleness of profit point is caused by singleness of user object. There are many fans of 2-dimensional culture in B station. If they cannot find new ideas in the face of profit dilemma, they are likely to lose their unique "foundation". The multi-directional investment but low return of B station also proves that the special user group makes it difficult to expand other businesses.

3.3.3 By the Shackles of Two - Dimensional Culture, "Out of the Circle" Difficult

In recent years, Station B has been involved in the direction of live broadcasting, documentaries, and variety shows and so on. It hopes to attract more users with different demands through the partition of the complete station, but the effect is not so good. In addition, the influx of a large number of non-quadratic users also has a certain impact on the cultural ecology of the quadratic community, making it more difficult to "get out of the circle".

3.3.4 Lack of "Core Business" Investment

Game and cartoon are the key content of B station's early investment, but in the face of limited funds, B station's investment in animation is obviously insufficient. At present, B station is also actively making strategic investment in Guomin. Whether it can seize the investment opportunity in the rise of Guomin and create its own guomin works with absolute right of discourse is the key to whether It can establish its "core business" in the future[4].

4. Optimization of Financial Strategy in B Station from the Perspective of CSR Fulfillment

In the further development, B should use positive and stable financial strategies to fully combine its own advantages with financial strategies. Actively seize external opportunities to improve the competitiveness of

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enterprises and take the path of sustainable development. Aiming at the problems existing in the financial strategy of B station, this paper proposes optimization countermeasures from three aspects of investment, financing and profit distribution respectively from the perspective of social responsibility.

4.1 Optimization of Investment Strategy Based on Social Responsibility

4.1.1 Optimize the Business Structure and Tap the Potential of Users' Consumption

Combined with the diversified investment strategy of B station, B station needs to optimize its business structure in the future, deeply explore the pan-quadratic industrial chain, and tap the potential of user consumption. In view of the downturn in the comic industry, B station can gradually launch the "bilibilicomic" APP through the merger with netease comics to discover users from video websites and increase user stickiness. While cultivating the ecology of original comics, explore the potential market for mature IP cooperation. In view of the high proportion of game income, B station can hold offline activities with related themes, produce peripheral products, and link with live broadcast area.

4.1.2 Broaden Investment Ideas and Shoulder the Responsibility of Spreading Positive Energy

At the present stage, the investment strategy of Station B is still centered on products, and at the same time, we can also consider broadening the investment ideas. For example, Station B could invest in an official MCN organization [5].To actively explore the quantitative changes of the platform and UP mainstream, invite unsigned small and medium-sized UP owners to join the official MCN organization, cultivate core UP owners in the station, and establish an effective ecological closed loop of we media in the station. UP has always been the core productivity of B's original content. Although B station has launched "incentive plan", it cannot solve the employment problem of "we media" for UP owners in many districts. Further improving the living environment of more UP zones is also the main project that B station should invest in in the future.

4.1.3 We Should Cater to the Investment Requirements of Socially Responsible Investors and Set up Corporate Image

As a gathering place of 2-dimensional culture, one of the labels of B station is youth, and its investment ideas have always been centered on the pan-2-dimensional industrial chain where young people consume a lot. This also requires B to establish a qualified positive corporate image in the investment and construction of the pan-quadratic industrial chain. The mainstream users of B station have always been young people born in the 1990s. It can be said that the image of B station is the epitome of its user group. Catering to the investment requirements of socially responsible investors and setting up an excellent corporate image in the construction of its own industrial chain are the new requirements of users, customers and the society for this emerging video website. At the same time, in recent years, many animation works that "tell A good Chinese story" have entered the public's vision. As a gathering place of 2-dimensional culture, Station B should also shoulder the responsibility of carrying forward Chinese traditional culture in new forms. Whether it is creation, supervision or promotion, how to present excellent Chinese stories to users is also a question that B station needs to complete as a new video website.

4.2 Financing Strategy Optimization Based on Social Responsibility

4.2.1 Establish a Financing Structure with Balanced Risk of Stakeholders

Although the industry has a positive attitude towards the future development of B station, but consecutive years of losses are not optimistic about the fact. With the investment from Tencent, Ali and SONY, B has no difficulty in financing, but relies entirely on equity financing, which is not conducive to risk control. Establishing a financing structure with balanced risk of stakeholders is an important issue that B should solve in the financial strategy at this stage. Most of the financing in B station now comes from the direct financing in the stock market, and the shareholders belong to outsiders[6].For shareholders, the information grasped by outsiders is ultimately limited. There is no information disclosure in the internal management and future strategic planning of B station, and there is also a gap in supervision. In addition, the unsatisfactory profit indicators in three consecutive years of financial statements, Station B did not perform its social responsibility to shareholders well. Therefore, in the future, B station must establish a financing structure with balanced risks for stakeholders, both for direct investors and indirect investors.

4.2.2 Innovative Financing Methods

The main financing method of Station B at the present

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stage is equity financing. In order to cope with the financing problems in the subsequent expansion period of enterprises, Station B can try to make innovations in financing methods[7].First of all, users in Station B are sticky-sticky and pay more attention to the future development of the website. Post-90s users, as the new generation of economic power, have certain demands for investment and financial management. Therefore, Station B can take advantage of this special advantage to establish "user fund" for different financing methods. Secondly, Station B can also try the way of debt financing to deal with the shortage of funds for rapid expansion in the short term, which can be used for hardware construction and R&D expenses, without affecting the internal decision-making level of the enterprise. Finally, in the face of high hardware costs such as broadband and servers, B station can try the way of financial leasing, which can not only keep pace with The Times on the equipment to cope with the great changes of broadband and servers in the 5G era, but also strengthen cost control in expense.

4.3 Profit Distribution Strategy Optimization Based on Social Responsibility

4.3.1 Strengthen Cost Control and Improve Profitability

Facing the high cost, B can focus on two aspects in the financial strategy: one is marketing cost, and the other is r&d cost. After good cost control, the profitability of B station will be improved to some extent.

4.3.2 Formulate a Relatively Stable Dividend Distribution Plan

In view of the status quo of B station, on the basis of ensuring that the financing and investment needs are fully met, the proposal of low normal plus additional dividend policy is put forward. The low normal plus extra dividend policy is suitable for the rapid development stage of the enterprise, which can not only enhance the shareholders' confidence in the sustainable development of the enterprise, but also facilitate the flexible capital dispatching of the enterprise. For the current financial situation of Station B, the low normal plus additional dividend policy can be implemented at the initial stage of substantial profit. The formulation of a stable dividend policy also puts forward a new requirement on the profitability of B station, and the formulation of a financial strategy to strengthen cost control is a guarantee for the smooth implementation of this strategy.

5. Conclusion

To sum up, the choice of corporate financial strategy has a decisive influence on the future survival and development of enterprises. Meanwhile, facing the topic of corporate social responsibility, how enterprises combine financial strategy with social responsibility has become a new issue for the survival and development of enterprises in the new economy and society. Taking B station as an example, this paper analyzes the deficiencies of the existing financial strategy of B station as an emerging video website under the background of the Internet, and makes improvement measures for the financial strategy of B station from the perspective of corporate social responsibility. The main research conclusions are as follows:

First, the relationship between corporate financial strategy and social responsibility is interactive. Appropriate corporate financial strategy is the basis for enterprises to fulfill their social responsibilities. The healthy development supported by corporate financial strategy is indispensable for enterprises to fulfill their social responsibilities smoothly. Corporate social responsibility should be a new goal of corporate financial strategy facing different parts of social responsibility, when formulating financial strategy, enterprises should add phased contents and reserve treatment methods. To ensure the survival and development of enterprises at the same time within the scope of their own development stage, to complete the corresponding social responsibility; the ultimate ideal of the two is that CSR fulfillment and corporate financial strategy complement and promote each other.

Second, the financial strategy of Station B has three aspects: The high cost affects the sustainable development, and the net profit keeps losing money, which reduces the capital confidence. Single investment thinking, lack of "core business" investment without strategic thinking, bound by the two dimensional culture, "out of the circle" difficult.

Thirdly, from the perspective of corporate social responsibility, the countermeasures to optimize the financial strategy of B station from the perspectives of investment, financing and profit distribution are as follows: While optimizing the business structure, B station needs to tap the consumption potential of users, broaden the investment ideas, shoulder the responsibility of spreading positive energy, and meet the investment requirements of socially responsible investors to establish an excellent corporate image. Establish a financing structure with balanced risk of stakeholders and innovate financing

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methods; Strengthen cost control, improve profitability, formulate relatively stable dividend distribution plan to enhance capital confidence.

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The Cause of Auditing Expectation Gap

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ABSTRACT

Previous literature show that auditors and the public have different understandings and beliefs about the auditor's responsibilities. The public's expectation of statutory audit may exceed the responsibility required by the auditing standard, which leads to the audit expectation gap. Since the 1980s, there are more and more criticisms on statutory auditors especially after the appearance of some auditing fraud such as Enron case in the United States and Maxwell's case in the United Kingdom. The misunderstanding from the public makes the auditor face more and more challenges. The purpose of this paper is to discuss the components of the gap, and discuss the main reasons based on the existing literature and cases. This paper makes a critical evaluation of the audit expectation gap from three parts: performance gap, standard gap, and reasonableness gap, respectively.

1. Introduction

Since the 1980s, statutory auditors have received more and more criticism from the public. Especially when some audit fraud, such as the Enron case in the US and Maxwell's case in the UK, appears. Some audit literature extensively demonstrates that public expectations of statutory audits may exceed the responsibilities required by standards, resulting in the auditing expectation gap [1]. It is defined by the gap between society's expectations for auditing and public perception of the actual performance of auditors. The two main components of the expectation gap are the performance gap and the reasonableness gap.

Expectation gaps are worth discussing, as their existence will prevent the public from recognizing the contribution of auditors and undermine the purpose of auditing. Therefore, this essay will focus on the components of the gap and discuss main causes based on existing literature and cases. The first and second section will focus more on the cause of deficient performance gap: lack of competence and practitioner independence. Then this essay will discuss deficient standards in relation to fraud and going concern issues. Finally, reasonableness gap are discussed as it is difficult to eliminate and such situation only can be improved by changing the concept of the public.

2. Cause 1 of Deficient Performance Gap: Lack of Competence

Auditor's competence can be defined as the professional knowledge and skills which the auditor has. It is a significant element that could affect audit quality because auditor lack of competence could cause a deficiency of performance. Therefore the audit expectation gap raised [2].

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Auditor's education and experience are the three core elements that could affect auditor's competence.

Auditors should receive a decent education before they commence the job which could improve their competence. For example, they obtained a bachelor's or master's degree in accountancy subject, including learning fundamental auditing knowledge and have the auditing concept in their mind. It is crucial because auditors may meet different situations, complex risks, and deal with the different investigation processes, nature of society, and laws. Therefore, auditors are required to have a high professional judgment in which education could help. On the other hand, qualifying education as also a significant section, it is indispensable for the auditor to learn new regulations, policy, skills continuously. The auditor is required and processing professional qualifications like ACCA, ACA, CPA etc for deepening their understanding of audit concepts and audit skill's capability [2].

In addition, auditor's experience, which also affects competence. The experienced auditor which means have skepticism and due care rather than step-by-step audit procedures. Generally, the core audit staff with enough experience could have higher competence to do complicated audit work, which could decrease the failure risks of performance. For example, in 2003, the HealthSouth accounting fraud scandal revealed that overstated $ 300 million in cash, evidence showed that audit failure was caused by inadequately experienced auditors [3]. EY audit team have limited experience to understand the risk of HealthSouth's internal control which causes the deficiency of performance of auditor (ibid).

3. Cause 2 of Deficient Performance Gap: Lack of Practitioner Independence

Another cause contributing to the deficient performance gap is the lack of practitioner independence. Practitioner independence is normally called "real independence," also known as the independence of mind. To be specific, practitioner independence involves the auditor's state of mind and how the auditor handles a particular situation [4].

Although the auditors are already competent and have formally complied with all safeguards and regulations, the performance gap will be hard to be eliminated as long as the problem of practitioners' independence is not sufficiently solved down because auditors could produce deliberately unfair or relatively low-quality audit reports. The factors that influence auditors to issue unfair audit report as follow: First one is self-interest threat, for instance, an unfavorable report may lead to a change of firm and affect subsequent revenue, so auditors tend to avoid issuing adverse reports [5]. Secondly, the auditor has a non-audit engagement relationship with the business. For example, the auditors provide non-audit services that affect the client's financial statements to the client, did the work that should be done by management, have close relationships with clients, or promoted a stand or point of view on behalf of the client [4]. Therefore, auditors cannot keep an objective attitude to conduct the audit. Thirdly, Auditors are influenced by fear or threats from clients so that they cannot keep an independent stand.

On the other hand, even qualifying auditors obeyed the code of ethics and all safeguards, unconsciously biased judgments are hard to avoid as long as it is possible to interpret information in a different way. For example, when judging others or things, people always tend to look for evidence to support their first-time judgment, rather than infer the judgment through evidence (ibid: 98). That is, if the company makes a positive first impression on the auditor, the auditor will be more inclined to prove that the doubt is irrelevant when it is discovered in the subsequent audit, which may lead to many errors.

In order to curb these problems, relevant organizations have launched many countermeasures, such as increasing punishment, divestiture of non-audited services, Partner rotation, more ethics education for auditors and etcetera. None of this, however, has changed the nature of the self-interest problem: Auditors act as "referees" for the enterprises that pay them [6]. Perhaps radical changes to auditing could be considered, such as handing that function over to the government rather than commercial firms. Besides, problems caused by unconscious bias are hard to root out or even hard to be found. The only way would be to strengthen the review and supervision of the audit process.

4. Cause of Deficient Standards Gap-Fraud

The deficient standard gap is that the public has reasonable expectations but exceeds the legal and professional responsibilities of auditors [6]. This part will discuss deficient standards in relation to fraud and next part going concern issues. Fraud issues will be discussed firstly.

In the process of setting audit standards, the process rationality of auditors and result rationality of the public must be considered [7]. For auditors, the standards may be set too high while it may be too low for the public, which will create a gap. To be specific, from the public perspective, due to the lack of knowledge of the audit procedures, they consider that the auditors can detect all fraud after the financial statements are audited. They are more inclined to the results instead of the process. However, the auditing standard cannot adequately meet the expectations of the

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public. From auditors' perspective, they consider that they have the right to report fraud but not duty [8]. According to SAS 1 Codification of Auditing Standards, auditors are responsible for planning and performing the auditing to obtain reasonable assurance as to whether the financial statements exist material misstatement due to errors or fraud. As the nature of audit evidence and the characteristics of fraud, auditors can obtain reasonable rather than absolute assurances.

On the one hand, in order to improve the efficiency of auditing, audit procedures have altered from the meticulous examination of each transaction to techniques related to testing samples (porter et al., 2013:469). It means that auditing scope is decreased. Consequently, audit sample risks increase, and non-sampling risks still exist. Auditors cannot detect all fraud and make a completed evaluation of audit objects and issue audit opinions based on limited samples. On the other hand, for auditors, the cost of detecting fraud exceeds the audit fees that a company is willing to pay, which does not accord with the cost-effectiveness principle. However, for the public, audit information is a public product, and the public does not need to undertake the cost when they use information.

Besides, the reason for the deficient standards gap is that the standards which auditor follow are not strict enough and that they are ambiguous in one way or another. According to Cohen (2013), new standards encourage auditors to improve their ability to detect fraud. Unfortunately, these standards contain terms such as "rationalization," whose definition is not accurate, only referring to "rationalizations to justify a fraudulent action" [9]. Especially when companies use the fraud triangle theory to rationalize internal fraud, it is difficult for auditors to make correct judgments based on current standards.

5. Cause of Deficient Standards Gap-Going Concern

According to the American Institute of Certified Public Accountants, going concern can be defined as: The auditor's judgment of a firm's capability to carry on as a going concern. The concept assumes firms will continue long-standing for all the firm's assets to be utilized fully. When it happens a significant doubt regarding a firm's capability to continue as a going concern, auditors need to identify and disclose the uncertainty in the report independently through professional standards requirement [10]. However, if the auditor fails to do so, it will cause the expectation gap.

In the United Kingdom, the going concern concept is covered by both accounting standards and statute law [11]. Evaluation of client's capability to carry on their business as a going concern is auditor's most fundamental judgment. The users of a financial statement like investors and analysts questioned a lot of whether auditors have the ability and also take enough responsibility for judging and evaluating going concern due to some of the information that may not be available to investors and analysts [10]. Therefore, the auditors must make sure the certified information is valuable, complete, accurate, and reliable. Auditor provides the going concern modified reports to the firms may be useful in tactical and strategic decision making, and it will promote the firm's management to avoid the circumstances that could lead to a going concern problem, what is more, it will also enhance firm business plan based on that going concern expectation [12].

Auditors could cause going concern error with three principal reasons. The first one is because of the auditor's lack of well understanding of their client's firm operations [13]. Between 2007-2009, several famous cases in the US and the UK's financial crisis, after the firms happened to the problem, indicated that even going concern qualification in financial statements had not issued by the auditors [13]. The economic considerations are the second reason, and there is a strong relation between going-concern audit reporting and audit quality [14]. The auditor issuing a qualification to protect its reputation and also to avoid the loss of audit [13]. Therefore, the auditor may attempt to present financial results as favourably as possible to cooperate with the audited company. The third is due to the outcome sometimes is different from what it predicted and expected even the auditor acts independently. There is always the risk existence of error unless it is one hundred percent sure that the company will not fail [13].

6. Reasonableness Gap

The reasonableness gap is in terms of the public has the unreasonable expectation to auditors which exceed the ability range, and can be attributed to two parts: Public misunderstanding and auditors' cost limitation [2]. The former embodied in the public hold too high expectations for auditors: they think auditors can deliver an audit report without any error (ibid: 812). For the latter, accounting firms as an independent third party are regarded as rational economic participants and the audit engagement is also restraint by the consideration of cost-effectiveness [15]. Audit process unable to cover all financial information while only "important" part would be checked because reviewing all the information represents a considerable time and money cost, and the objective of the accounting firm as profit-making organizations is to maximize the profit [4]. It is also because of this that the materiality, tolerance for

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errors, these audit terms appear.

7. Conclusion

This essay critically evaluated the audit expectation gap through three components which are performance gap, standard gap, and reasonableness gap, respectively. Firstly, lack of competence and problem of practitioner independence both are contributing to the deficient performance gap: Auditor's educational background, receiving proper professional training and experience are the three core elements that could affect auditor's competence. Additionally, Self-interest threat, non-audit engagement relationship, intimidation threat and unconsciously bias have been impeding the latter. Secondly, in the level of deficient standard gap, fraud and going-concern are discussed as emphasis: the essay argued fraud standard deficient reflected auditors had right to research but not the duty to report fraud. Besides, appearing of going- concern problem stem from three factors: Lack of well business understanding, economic considerations, and the hard predicted outcome. Thirdly, the unreasonableness gap root in the public misunderstanding and auditors' cost limitation. Moreover, the further recommendation was given at the end of the par

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Study on the Follow-up Measurement of Goodwill of Listed Companies

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ABSTRACT

Nowadays, the wave of mergers and acquisitions in the capital market is still surging. High evaluation does bring high performance, and the huge impairment of goodwill has become a key factor for the frequent Black Swan events of listed companies. Starting from the essence of goodwill, using Chinese A-share listed companies from 2007 to 2019 as samples and based on the market data, distribution analysis and performance impact, this paper argues that problems of goodwill impairment in China are incomplete accounting standards, inexhaustive impairment implementation and incomprehensive market supervision, thus giving reasonable suggestions. Proper follow-up measurement of goodwill is conducive to improving accounting information quality and adapting to capital market demands, which is of great significance to the revision of international standards.

1. Introduction

The wave of mergers and acquisitions of A-share listed companies and the continued increase of the goodwill book value have recently made the goodwill impairment risk prominent. Wind data show that, as of the end of 2019, there are 3,839 listed companies in Shanghai and Shenzhen A-share markets, with a total goodwill of 1.26 trillion yuan and goodwill impairment of 3.816 billion yuan, accounting for 6.63% of net profit. And goodwill impairment risk once outbreaks, it will distort the market resource allocation while bringing a fatal blow to the normal operation of enterprises. Accounting treatment has a direct impact on whether trillion of goodwill becomes a bubble and whether pressure of impairment can be alleviated.

2. Goodwill

2.1 The Essence of Goodwill

Goodwill was first used in legal disputes in the 16th century[1], then defined by the British judiciary as all the advantages obtained by an enterprise in its going concern[2], defined in the 19th century as the profits earned by continuous consumption of customers' goodwill[3] and in the 20th century as the general term for all the reasons for excessive profits[4]. At present, it is generally believed that goodwill is the accumulated potential value that can bring future economic benefits to the enterprise in the process of operation, which can be quantified as the acquisition premium between the investment cost paid by the acquiring enterprise and the net assets of the acquired enterprise in M&A.

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The essence of goodwill has always been controversial, and the more influential viewpoints include the synergistic effect theory, the ternary theory and the core goodwill theory.

The synergetic effect theory (Hermann Haken, 1971)[5] is applied in the field of goodwill to form the view that goodwill is the synergetic effect among enterprise elements, and the cooperation among various elements makes the overall comprehensive value higher than the sum of each individual value. Goodwill makes excessive profits on account of the positive synergies between internal factors and external environment, thus creating new value.

The ternary theory (Eldon S Hendriksen, 1977)[6] can be divided into favorable value theory, excess earning theory and master valuation account theory. According to the favorable value theory, goodwill is the subjective favorable impression generated by customers due to corporate image or related interests, which cannot be measured and recorded. According to the excess earning theory, goodwill is the part where the present value of an enterprise's expected profit exceeds the normal level. According to the master valuation account theory, goodwill is the difference between the overall value of an enterprise and the fair value of its identifiable net assets. Among them, the master valuation account theory has been widely recognized for its quantifiable advantages, but the current accounting standards in China only recognize the difference generated by M&A and do not include the internally generated goodwill.[7]

The core goodwill theory (FASB, 1999)[8] believes that goodwill consists of six elements: the difference between the fair value of the acquiree's net assets and its book value at the acquisition date; the fair value of the acquiree's other unrecognized net assets; the fair value of the going concern component of the acquiree's ongoing business; the fair value of synergies between the acquirer and the acquiree's net assets and business; the amount overmeasured by the acquirer due to errors in measuring the acquisition offer; and the difference between the amount paid by the acquirer and the normal level due to an incorrect estimate.

This paper holds that goodwill is the capitalized value between a listed company's future economic earnings and the normal profitability of its identifiable net assets.

2.2 Follow-up Measurement of Goodwill

At present, goodwill impairment is the main way for listed companies to measure goodwill. Goodwill impairment means that the enterprise shall conduct impairment test on goodwill annually, and if any impairment occurs, it is required to truthfully disclose and make provision for impairment.

China Accounting Standards Committee (CASC) once issued the Corporate Accounting Standards Update (9th Issue, 2018), announcing the feedback of the advisory committee on the topic of goodwill and its impairment, which indicated that most of the advisory committee members approved the change of the current operation of goodwill impairment to goodwill amortization. In June 2020, the International Accounting Standards Board (IASB) presented its preliminary opinions in the discussion draft of Business Combinations—Disclosures, Goodwill and Impairment in the seminar, in view of the cost and effect of goodwill impairment, that goodwill amortization should not be reintroduced for the time being.

Due to the fact that when the purchased goodwill is actually recognized in the current criteria, in addition to its reasonable value, it is also affected by other factors such as valuation deviation and agency deviation, scholars have proposed that goodwill can be divided into recognized and unrecognized (Wang Jing, 2015)[9]. The recognized one adopts the yearly impairment test method. The unrecognized one is divided into valuation and agency deviation, unrecognized assets and liabilities, the former of which directly writes down the capital surplus while the latter is disclosed in financial statements.

Some scholars also expressed that the change of goodwill impairment to amortization could not solve the problem (Zhang Xinyuan, 2017)[10], so it should return to the disadvantages of the impairment test method itself and make up for them, such as refining the standard of judgment of goodwill impairment, optimizing the process of goodwill impairment test and strengthening the supervision of mergers and acquisitions of listed companies.

Additionally, the insistence on using a combination of amortization and impairment test for subsequent measurement of goodwill (Zhang Naijun, 2018)[11] is based on the fact that the current system does not conform to the principle of accounting prudence and matching principle, and the combination of the two is conducive to risk reduction in the current active capital market.

The amortization method should be reintroduced (Tan Yawen, 2019)[12], the rationale of which is that the current impairment test method relies too much on management's subjective judgment, and the costly and complicated process is prone to errors. The combination of the two can reduce costs and difficulties and urge the management to cautiously recognize goodwill from a longer perspective.

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3. Status Quo of Goodwill Impairment of Listed Companies in China

3.1 Scale of Goodwill Impairment

In order to study the value of goodwill and its impairment, this paper selects all A-share listed companies in Shanghai and Shenzhen from 2007 to 2019 for data analysis based on Wind database.

3.1.1 Descriptive Statistical Analysis of the Book Value of Goodwill

Table 1. Statistical analysis of the book value of goodwill[①]

Year	Total book value of goodwill (100 million yuan)	Number of A-share listed companies	Number of companies with goodwill	Mean value (100 million yuan)	Maximum value (100 million yuan)
2007	419.55	1479	545	0.77	156.90
2008	813.69	1532	623	1.31	143.28
2009	872.60	1678	679	1.28	141.63
2010	942.42	2027	750	1.26	119.56
2011	1356.06	2306	919	1.48	132.05
2012	1674.81	2453	1070	1.57	138.40
2013	2106.77	2463	1202	1.75	121.81
2014	3427.67	2588	1350	2.54	120.37
2015	6473.76	2806	1571	4.12	455.89
2016	10599.74	3029	1710	6.20	460.97
2017	13105.85	3462	1901	6.89	419.34
2018	13232.81	3563	2032	6.51	401.28
2019	12572.34	3839	2088	6.02	428.08

Overall, total book value of goodwill has shown a steady rise, with only a brief decline from 2018 to 2019. Since 2014, the book value of goodwill has shown a doubling trend, growing from 342.767 billion yuan to 1.059974 trillion yuan in just two years. It can be seen that listed companies have attached great importance to the significant influence of goodwill on financial statements year by year, while the explosive mergers and acquisitions have made the value of goodwill soaring, thus accumulating a considerable amount of goodwill impairment risk. In contrast, in the past three years, the book value has been generally stable, even with a slight regression, which shows that the follow-up measurement and accounting treatment of goodwill after frequent Black Swan events has become a difficult problem.

From the perspective of the maximum and average book value of goodwill, the maximum value increased vertiginously in 2015, about four times that of the previous year, and then fluctuated. Compared with the maximum value, the average value is at an awkward level, indicating a high degree of polarization in the book value of goodwill.

3.1.2 Descriptive Statistical Analysis of Goodwill Impairment Loss

Table 2. Statistical analysis of goodwill impairment loss[②]

Year	Total goodwill impairment loss (100 million yuan)	Number of impaired companies	Average value (10 million yuan)	Maximum value (100 million yuan)	Median (10 million yuan)
2007	5.44	50	1.09	2.39	0.32
2008	23.16	82	2.82	9.19	0.30
2009	7.56	68	1.11	1.75	0.45
2010	12.77	63	2.03	2.38	0.47
2011	13.29	73	1.82	2.92	0.26
2012	10.67	95	1.12	1.66	0.35
2013	17.09	138	1.24	1.45	0.50
2014	32.28	162	1.99	2.50	0.65
2015	77.49	249	3.11	6.16	0.83
2016	101.31	345	2.94	6.53	0.89
2017	349.48	460	7.60	12.59	1.39
2018	1600.10	831	19.26	40.59	3.63
2019	318.16	724	4.39	9.42	2.58

In general, goodwill impairment loss showed a wavy growth trend from 2007 to 2014, only with a slightly decline in 2008, related to the economic downturn in that year. From 2014 to 2018, goodwill impairment loss began to rise sharply, almost doubling each year, 2015 for the previous year twice, 2017 for the previous year three times and 2018 for the previous year four times. The number of goodwill impairment companies increased by 412.96% from 162 in 2014 to 831 in 2018, and goodwill impairment loss increased by 4856.93% from 3.228 billion yuan in 2014 to 160.01 billion yuan in 2018. By 2019, however, the impairment loss fell precipitously and recovered to a level comparable to that of 2017, mainly due to the large amount of impairment losses collectively recorded by enterprises in 2018.

In terms of the maximum value of goodwill impairment loss, there was a breakneck rise in 2008 and 2018. Com-

① Upon inquiry, all the minimum value is 1 yuan, which is represented by Shanghai Jion Buy and Hengdian Group DMEGC Magnetics claiming that value of goodwill cannot be reasonably estimated so as to change into an intangible asset accounting, amortization and provision for large impairment.

② The above table excludes listed companies with negative goodwill impairment loss due to the cancellation of subsidiaries, etc. The number of impairment companies excludes listed companies with impairment losses equal to zero, and the mean and median are calculated based on the number of impairment companies.

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bining the mean and median, it can be found that the gap between the two indicates that some listed companies have made a large amount of impairment provisions, directly pulling up the overall data and reflecting the polarization issue.

3.1.3 Concentration Analysis of Goodwill Book Value

The above table shows that the book value of goodwill has been yearly increasing since 2007, while the proportion of the top ranking companies in the overall market has been yearly decreasing basically, which reveals that more listed companies participate in the goodwill recognition and the phenomenon of mergers and acquisitions has gradually become normalized so that goodwill is no longer unique to large enterprises. At the same time, the top 20 listed companies still account for nearly 25% in recent years, demonstrating that a small number of enterprises have huge goodwill, and the concentration degree of goodwill book value is still in a relatively high state.

3.1.4 Concentration Analysis of Goodwill Impairment Loss

As can be seen from the above table, goodwill impairment losses are also increasing annually while the proportion of the top listed companies is decreasing annually, which is similar to the trend of goodwill book value. Goodwill impairment loss of the top 20 listed companies also accounts for about 25% recently and there are still a few enterprises with high impairment provision and several enterprises with little or no impairment provision

Table 3. Concentration analysis of goodwill book value

Year	Total book value of goodwill (100 million yuan)	Maximum value (100 million yuan)	Top 5 total amount (100 million yuan)	Top 10 total amount (100 million yuan)	Top 15 total amount (100 million yuan)	Top 20 total amount (100 million yuan)	Top 5 amount proport-ion	Top 10 amount proport-ion	Top 15 amount proport-ion	Top 20 amount proport-ion
2007	419.55	156.90	225.33	266.93	291.93	307.77	54%	64%	70%	73%
2008	813.69	143.28	431.93	536.49	600.46	633.01	53%	66%	74%	78%
2009	872.60	141.63	420.92	524.12	590.23	632.65	48%	60%	68%	71%
2010	942.42	119.56	428.23	544.18	613.45	655.98	45%	58%	65%	70%
2011	1356.06	132.05	487.27	742.54	834.49	898.12	36%	55%	62%	66%
2012	1674.81	138.40	512.98	760.04	858.85	935.99	31%	45%	51%	56%
2013	2106.77	121.81	530.00	817.99	953.96	1051.52	25%	39%	45%	50%
2014	3427.67	120.37	522.42	870.91	1054.61	1193.24	15%	25%	31%	35%
2015	6473.76	455.89	881.98	1264.20	1537.30	1772.61	14%	20%	24%	27%
2016	10599.74	460.97	1295.88	1961.91	2425.47	2779.01	12%	19%	23%	26%
2017	13105.85	419.34	1342.73	2055.13	2562.20	2985.17	10%	16%	20%	23%
2018	13232.81	401.28	1361.69	2130.79	2715.99	3168.72	10%	16%	21%	24%
2019	12572.34	428.08	1408.87	2256.69	2836.69	3292.68	11%	18%	23%	26%

Table 4. Concentration analysis of goodwill impairment loss

Year	Total goodwill impairment loss (100 million yuan)	Maximum value (100 million yuan)	Top 5 total amount (100 million yuan)	Top 10 total amount (100 million yuan)	Top 15 total amount (100 million yuan)	Top 20 total amount (100 million yuan)	Top 5 amount proport-ion	Top 10 amount proport-ion	Top 15 amount pro-port-ion	Top 20 amount proport-ion
2007	5.44	2.3900	3.66	4.41	4.72	4.94	67%	81%	87%	91%
2008	23.16	9.1878	18.00	19.80	20.83	21.47	78%	85%	90%	93%
2009	7.56	1.7473	4.10	5.04	5.66	6.16	54%	67%	75%	81%
2010	12.77	2.3803	7.46	9.42	10.51	11.28	58%	74%	82%	88%
2011	13.29	2.9173	7.85	10.27	11.59	12.16	59%	77%	87%	91%
2012	10.67	1.6590	4.56	6.08	7.12	7.92	43%	57%	67%	74%
2013	17.09	1.4450	5.47	7.22	8.66	9.90	32%	42%	51%	58%
2014	32.28	2.5023	9.80	13.40	15.48	16.86	30%	42%	48%	52%
2015	77.49	6.1625	22.17	33.89	42.77	48.39	29%	44%	55%	62%
2016	101.31	6.5272	22.56	33.76	40.33	45.90	22%	33%	40%	45%
2017	349.48	12.5900	37.65	60.03	78.69	94.67	11%	17%	23%	27%
2018	1600.10	40.5900	171.85	288.01	375.41	453.34	11%	18%	23%	28%
2019	318.16	9.4200	35.39	48.64	57.95	64.51	11%	15%	18%	20%

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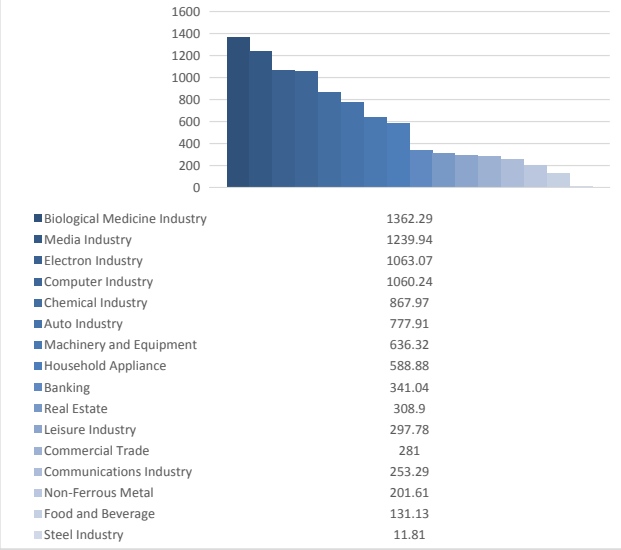
in the market. But in particular, the goodwill impairment losses in 2018 and the year before and after showed a sharp growth and decline respectively, indicating that in 2018, Chinese listed companies appeared a phenomenon of centralized provision for large impairments, and the goodwill impairment test showed an imbalance in market self-adjustment.

3.2 Distribution of Goodwill Impairment Industry

The risk of goodwill is macroscopically controllable, but for some industries, it accounts for too much. The scale of goodwill is calculated by industry, and the results are shown in Table 5.

Table 5. Scale of goodwill in various industries by 2019 (100 million yuan)



It is not difficult to see that high goodwill industries mostly include medicine, media, computer and other emerging industries. Emerging industries are still in initial development, whose goodwill generally makes striding growth, but a slight accident is a fatal blow. For example, in 2017, the value of goodwill among the top 50 listed companies reached 25.509 billion yuan, with an average of more than 500 million yuan. From the perspective of ranking, the top 10 listed companies have incurred a total goodwill impairment of up to 14.367 billion yuan and realized a net loss of 17.9 billion yuan. Meanwhile, it reflects that the excessive autonomy of corporate managers over the amount of goodwill impairment.

3.3 Performance Impact of Goodwill Impairment

In addition to being directly reflected in financial statements, goodwill impairment will also have an intuitive impact on corporate performance, like corporate performance assessment, follow-up financing, customer evaluation, etc., among which the financial indicator with the most extensive impact is net profit.

The analysis of the above table shows that in the group with influence degree < 0, the reason why the ratio is < 0 is that the net profit of the group has been negative before the provision for impairment, that is, the absolute value of the average impact degree of the group is positively correlated with the impact of goodwill impairment loss. In the group with influence degree of 0-0.2, the number of companies is the largest, while the number of companies in the remaining group is lower. It is worth noting that the group with the degree of impact > 1 means the net profit of the current period is less than the goodwill impairment loss, that is, the enterprise changes from profit to loss, which directly leads to negative performance.

Table 6. Degree of performance impact of goodwill impairment①

The degree of impact of goodwill impairment on net profit *	Number of listed companies in the group	Mean influence degree within the group	Total goodwill impairment loss (100 million yuan)	The proportion of goodwill impairment loss	Book value of goodwill calculated at the advanced point (100 million yuan)	The proportion of book value of goodwill calculated at the advanced point
< 0	37	-1.2708	26.46	26.14%	135.15	7.35%
0-0.2	247	0.0505	37.34	36.88%	1478.39	80.45%
0.2-0.4	31	0.2665	13.77	13.60%	102.51	5.58%
0.4-0.6	14	0.4916	8.10	8.00%	47.63	2.59%
0.6-0.8	5	0.6857	3.54	3.49%	34.09	1.86%
0.8 1	2	0.9013	2.99	2.96%	7.34	0.40%
> 1	5	6.1738	9.03	8.92%	32.50	1.77%
Summation	341	-0.0468	101.24	100%	1837.60	100%

Note: *The following two formulas are used as analytical indicators to investigate the impact of goodwill impairment on net profit: the impact of goodwill impairment on net profit = goodwill impairment loss recognized in the period / net profit before impairment provision; net profit before impairment provision = net profit + goodwill impairment loss recognized in the period.

① Data sources are financial statements of all listed companies in 2016.

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The average influence degree within the group reflects the average influence level of goodwill impairment loss on net profit of the group. As we can see, except for < 0 group and > group 1, the mean value of all other groups is within (0,1), and the negative total value is mainly affected by < 0 group, so that in the case of negative net profit, the use of goodwill impairment to exaggerate loss is consistent with surplus management.

Analysis of each category of goodwill impairment loss ratio and goodwill book value before accounting period, can be found that the two are not consistent, especially in the < 0, 0-0.2 and > 1 groups, there is an inverse relationship of "one high and one low", namely the goodwill of high impact on net profit group largely confirmed a huge goodwill impairment loss.

Overall, the greater impact of goodwill impairment on performance of listed companies is, the greater proportion of impairment is, while companies with less impact tend to recognize high goodwill but make little or no goodwill impairment, which fully reflects the current goodwill accounting standards in China is not perfect, goodwill impairment implementation is not in place and market regulation is not comprehensive.

4. Suggestions on Goodwill Impairment of Listed Companies

4.1 Clarify the Normative Impairment of Guidelines

The current standards are ambiguous in positioning of goodwill impairment test of listed companies and have low operability. For example, the specific method and corresponding basis of asset group division are not clearly defined. Moreover, impairment measurement is inevitably subjective, but accounting standards lack relevant restrictions and operating norms, which gives listed companies more freedom to operate data.

Therefore, the standard operation of goodwill impairment in the criterion should be clarified, such as estimating the overall profitability and subsequent cash flow of the industry as a unit, measuring the average goodwill scale, publishing relevant data and serving as industry reference, and limiting the floating level range of goodwill impairment in the industry, so as to avoid the sudden huge losses of listed companies. At the same time, unified evaluation standard can be adopted in the criteria to limit the premium rate range of M&A goodwill during the initial measurement of goodwill, in order to avoid the existence of huge goodwill at source and reduce the risk of goodwill impairment test.

4.2 Enhance External Supervision

In the context of imperfect development of China's capital market, it is of great significance for external regulatory authorities to intervene when the market is unable to adjust itself.

First, during the initial goodwill measurement, the regulators should get to know the basic situation to avoid high premium because of the blind optimism, like the acquiree's operating capacity, credit rating, debt level and so on, and combine with the specific industries to estimate the maximum acceptable premiums to provide judgment for subsequent performance. Secondly, the regulatory authorities should make recommendations for the modification of the performance commitment agreement in the merger clauses to minimize or even eliminate the situation that the blindly exaggerated growth rate is inconsistent with the actual business capacity of the enterprise. Finally, the regulatory authorities should also supervise other relevant departments to see if there is any unreasonable behavior, such as strengthening the supervision of certified public accountants, the review of asset appraisal institutions and so on.

4.3 Improve the Synergy of Mergers and Acquisitions

Enterprises can improve the synergy effect from three aspects to reduce risks.

On the one hand, the listed company shall have effective internal control management system, risk management mechanism and project development planning to ensure its operation qualifications and profitability reaching a desired level, and can bear the risk of stock price decline due to unfavorable factors including goodwill impairment in the M&A projects. Also, they should be according to their own development plan to promote M&A projects, rather than blindly follow market trend. On the other hand, listed companies should pay close attention to the relevant information of the acquiree before the acquisition, prudently predict the synergy effect and impairment risk, comprehensively evaluate the existing capabilities and future prospects of the target company combined with the enterprise development needs and requirements. With the help of a professional assessment organization of independent judgment on the business and cost, enterprises can make a careful decision to reduce the risk of goodwill impairment. Finally, the listed company should continuously follow up the cooperative integration of both parties after the merger, including the stability of operation ability, the competitiveness of innovative business, the continuity of profit level, the rationality of resource allocation and the consistency of

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financial system. Only in this way can the two parties make better use of the synergy effect, create excess profits and reduce the risk of impairment.

4.4 Explore Optimal Measurement Methods

Goodwill impairment and amortization have their own advantages and disadvantages, are also questioned respectively.

Although the impairment test method is rigorous and operable, it has high execution cost, and the cover effect caused by the net value makes the book value of goodwill overestimated, resulting in the management unable to take corresponding responsibility for its decision.

The amortization of goodwill can reflect the consumption of goodwill effectively, but the usefulness of its accounting information is questionable, and the determination of the amortization period and the amortization method does not reduce the cost.

Therefore, IASB stated in the preliminary opinion that both impairment and amortization, two accounting treatments of goodwill, have limitations. Currently, there is no impairment test that can directly test goodwill, and it is difficult for amortization to estimate its useful life and consumption loss pattern. So a combination of the two might work. In the regular business cycle of listed companies, goodwill is generally consistent with it. In this case, the use of systematic amortization method can reduce the annual cost of goodwill impairment test, and meanwhile limit enterprises' behavior of using goodwill to whitewash statements in normal operations. For significant matters that affect a company's reputation, impairment test can be used to accurately reflect the book value of goodwill. Besides, for the impairment test of goodwill, it is feasible to optimize the asset group identification, simplify the recognition of recoverable amount, and allow the use of after-tax cash flow and after-tax discount rate in estimating the value in use.

5. Conclusion

The current economic growth rate has fallen again, and various indicators are developing steadily, but the prospect is worth worrying about. In this economic downturn, enterprises may not be able to bear the economic consequences of the goodwill impairment provision. It can be seen that the subsequent measurement of goodwill is only the final result of multi-party game under different economic environments.

In view of the high book value of goodwill and frequent occurrence of black swans among listed companies in China in recent years, through essential exploration and data disclosure, this paper puts forward suggestions on clarifying impairment standards, enhancing external supervision, improving the synergy effect and exploring optimal measurement methods. It is noteworthy that the accounting standards related to the subsequent measurement of goodwill, as the financial standards of enterprises, are essentially trying to help enterprises take off the "sin cap" they have put on.

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The Possiblilty of Pola to Enter the Kuala Lumpur Market

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ABSTRACT

Pola's current development goal is to access to the ASEAN market, and Kuala Lumpur, Malaysia is its best market choice. This proposal provides a theoretical and practical basis for entering the market by analyzing the market economy in Kuala Lumpur, which includes its consumer preference, product quality and safety standards, consumers' recognition and loyalty for products, and laws and regulations related to cosmetics. At the same time, this paper also provides relevant solutions to the problems and challenges that may be encountered when entering the market. Moreover, referring to the successful developments in Singapore and Bangkok, compared with other untapped markets in ASEAN, Kuala Lumpur is the most suitable target for Pola development at this stage.

1. Background

Malaysia's GDP in a growing trend in recent years, from USD 301.26 billion in 2016 grew by 17.6 percent in 2019 to USD 364.7 billion (Trading Economics, n.d. a)[21], and the economic growth is likely to boost the country's domestic demand growth (Loganathan et al., 2017)[13]. The capacity of this market in Malaysia will be expected to have some growth potential in the next few years. Also, the cosmetics market in Malaysia reached USD 407 million in 2013, and most of the market demand is met by imported goods (Hassali et al., 2015)[10]. Based on this trend, it can be inferred that the local population will spend more money on consumer goods and cosmetics, which is an opportunity for Pola to enter this market.

In addition, Malaysia tourism industry is the one of its core industry, about 10 million arrives of tourists bring about $86 billion MYR for Malaysia (Trading Economics, n.d. b)[22], and its national policies also promote the development of tourism in terms of material, social and economic factors (Anuar et al., 2013)[2]. Besides the local population, more tourists will increase the spending power of this city, So Kuala Lumpur is expected to grow in the future.

Doing business in Malaysia also takes into account a number of objective factors, including its religious beliefs, trade rules, and its cosmetics regulatory system. As a large proportion of the population in this country has religious beliefs, these different religious beliefs will have a certain impact on the consumption habits and preferences of local consumers (Mokhlis, 2006)[15]. This also led to the promotion of Halal Cosmetic products by local Muslim consumers in recent years (Hassali et al., 2015)[10]. Malaysia's trading system is in a relatively open environment. As an economically export-oriented country, international trade plays an irreplaceable role in the country's economic development (Okafor & Teo, 2019)[16]. This country regulates cosmetics and related industries mainly according to the regulations of Control of Drugs and Cosmetics Regu-

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lations 1984[7].

2. Proposal to Enter the Kuala Lumpur Market

In recent years, with the continuous development and growth of the company, it had become the fourth largest cosmetics company in Japan in 2018. (Japan Products, 2018)[12]. However, compared to the more top companies, such as Shiseido and Kao, Pola entering for the development of the international market is still very slow. As one of the fastest-growing markets. The size of the Asia-Pacific market has exceeded 70 billion US dollars (Hassali et al., 2015)[10], so the growth trend of the Southeast Asian market has attracted the influx of many domestic and international competitors of the company, while Pola still only enters the two markets of Thailand and Singapore (Pola, n.d.)[18] among the ASEAN member countries. The smooth development of Pola in these two markets has also laid a solid foundation for the company's comprehensive strategy to enter other Southeast Asian markets. Therefore, after a detailed analysis of the current economic situation of Malaysia and the development situation of the cosmetics market at the present stage, there is a proposal to enter the Kuala Lumpur Market has been developed.

This proposal will be divided into the following several parts: the survey of this potential cosmetics market, the challenges and risks that Pola will face when entering this marker, recommendations for the company's board, and the introduction of stakeholders involved in developing this proposal.

3. Content of Investigation

3.1 Control of Drugs and Cosmetics Regulations 1984

The Cosmetics and related Industries Ordinance in Malaysia are implemented under the CDCR 1984. The main purpose of this regulation is to ensure that the safety, quality, and efficacy of cosmetics meet the testing standards of the Government of Malaysia. The Drug Control Authority (DCA) is the government agency responsible for overseeing the entire process from the manufacture to the sale of cosmetics. Besides, the cosmetics industry includes beauty salons, which are also regulated by the DCA (Control of Drugs and Cosmetics Regulations 1984).

3.2 Safety Issues

According to the existing reports, some cosmetics in the Malaysian market have quality problems and potential safety issues. To meet the needs of customers, some irresponsible companies provide some beauty products that can achieve the maximum effect in a short time, but the production and sale of these products do not meet the requirements of the authorities, they will cause adverse effects on the human body. Moreover, some toxic elements are used in the manufacture and processing of non-compliant beauty products, such as Hydroquinone, Tretinoin, Mercury, and Diphenhydramine (Othman, Zakaria, & Aziz, 2020)[17]. According to the research of Hashim (2003)[9], two-thirds of the samples he surveyed were contaminated with these harmful elements, which is quite a large proportion.

In addition to these harmful elements, some cosmetic ingredients may cause skin allergies or other complications to the user. For example, Asian women generally have a certain degree of preference for whitening products, even if they know that some ingredients will bring side effects to the human body (Mansor, Ali, & Yaacob,2010)[14]. According to Thomas (2020)[20], 80% of consumers pay attention to the ingredient list when choosing skin-care products containing whitening ingredients, and 78% of consumers know that some ingredients have side effects (Ho, 2017)[11]. Although only 36.6 percent of consumers use these products without side effects (Ho, 2017), there is still a huge demand for whitening products.

This widespread safety and quality issue is an opportunity for Pola to enter the Malaysian and Kuala Lumpur markets. As the Japanese government has strict requirements on cosmetics quality and safety, Pola is confident that it can meet the requirements of DCA on cosmetics quality. In addition, Pola, as a brand with anti-ageing and whitening products as its main products, has a relatively rich product line, including internal health care products, skin care products, and cosmetic products for external use, which can meet the pursuit of the whitening effect of different consumer groups.

On the other hand, the regulation of DCA on beauty salons does not reach the level stipulated in the regulations, which leads to the operation of a large number of non-compliant beauty salons in the market, causing safety hazards to consumers' health. According to Chuo et al. (2018)[6], 96.8 percent of beauty salons have not applied for the relevant license, with the common reason being that these operators do not know how to apply for certification. Although 70 percent of respondents had heard of the CDCR84 regulations, more than 80 percent of beauty salon operators were not aware that the regulations were relevant to their business. If Pola can apply for a salon license and sell cosmetics, it will have a strong competitive advantage in this market. High quality and safe service are what consumers in Kuala Lumpur desperately need right now.

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3.3 Brand Value and Brand Loyalty

Consumers' recognition of the brand value and loyalty to a brand product is affected by many factors: product safety, product quality, product price, product design style, self-expressive value and perceived value of customers (Azuizkulov, 2013[4]; Eze, Tan & Yeo, 2012[8]; Aziz & Ngah, 2019[3]). Moreover, consumers' satisfaction with products after use also determines their loyalty to this brand (Chan & Mansori, 2016)[5]. Their acceptance of product price reflects their recognition of product value, and these two factors show a positive correlation. They sometimes do not mind paying higher prices for the same kind of cosmetics if the quality and efficacy of the products can meet their needs. Also, the popularity of the manufacturer and the prevailing trends in the market will influence consumers' brand recognition and product selection (Rani & Krishnan, 2018)[19].

3.4 Religions and Halal cosmetic products

Not only do halal cosmetics contain ingredients that do not include alcohol, pork, carmine, or animal products, but the companies that produce them must have the same value, which means that they do not use animal testing and a range of practices that do not conform to Muslim values (Rani & Krishnan, 2018). Due to the large Muslim population in Malaysia, halal cosmetics make up a large part of the market. If a brand meets the requirements of Halal certification, it can not only gain recognition from a large number of Muslim customers but also show an attitude of the brand. However, as for Pola, its values and design philosophy do not conform to the concept of halal cosmetics.

4. Challenges and Risks

The biggest challenge Pola faced in entering the Kuala Lumpur, and Malaysian markets were the level of consumer preference for halal cosmetics in this market. If a brand meets the requirements of Halal certification, it can not only gain recognition from a large number of Muslim customers but also show an attitude of the brand. However, as for Pola, its values and design concepts are not consistent with the concept of Halal cosmetics. If Pola caters to the preferences of this part of consumers, it may lose the value of its brand itself. For example, some of the products produced and sold in Pola contain alcohol. If the ingredients list of products is deliberately changed, the effect of products may change, which will have a certain impact on product safety and quality assurance. Therefore, entering the Kuala Lumpur market should take into account the adverse factors in this respect. Fortunately, while consumers religion to a certain extent, affected their choice for cosmetics, but there are reports of cosmetics is not as big as the impact on food, that is, refused to Muslim consumers for non-halal cosmetics is not absolute (Abd Rahman, Asrarhaghighi & Ab Rahman, 2015)[1], Pola needs to focus on non-Muslims in the consumer market.

The second issue is how to build brand value and gain consumer recognition. To resolve the issue, the company must first understand the relationship between skin and usage of cosmetics and determine the market positioning of Pola, which is a high quality and efficient product at the top end of the market, and it is now demanded by the Kuala Lumpur market. Therefore, in the early stage of entering the market, Pola needs to gain customers' cognition through a series of marketing means and understand the products and services the brand can provide them. At the same time, a non-Halal label is necessary to help the Pola avoid moral hazard and help consumers have a clearer understanding of the brand's positioning. Finally, products need to remain loyal customers through the sensation and satisfaction of customer feedback.

5. Recommendations

Pola's mainstream businesses include skincare, cosmetics and beauty salons needed to enter the Kuala Lumpur market. First, it is an integral part of the company's future access to more international markets. Demand for high-end cosmetics in Malaysia, one of the more economically developed countries in the 10-member Association of Southeast Asian Nations, provides an opportunity for the Pola. This company has already entered Thailand and Singapore, and smooth development in these two markets has also helped to enter the Kuala Lumpur market. Singapore is so close to Kuala Lumpur to provide convenient transportation and technical support for the products. The economic and urban positioning of Bangkok in Thailand and Kuala Lumpur tend to be driven by tourism, which makes the development plan in Bangkok as an effective reference template for the development of the Kuala Lumpur market. Moreover, as a tourist city, Kuala Lumpur has not only local consumers but also a large amount of tourism consumption, which also increases the volume of high-end consumers in The Kuala Lumpur market.

Besides Kuala Lumpur, other markets are also potential targets in the company's future development plans. However, the economic development and geographical location of the Philippines, Vietnam, Myanmar and Laos are relatively weak compared with Malaysia, and the political and security conditions in India make this country not the best choice for the Pola at this stage. Therefore, at this stage, the best place to enter the ASEAN market in Kuala

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Strategies for Chinese Engineering Enterprises in International Publicity from the Perspective of Domesticating Translation——Case Study of CRCC

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ABSTRACT

With the expanding overseas markets to Chinese enterprises, the international publicity has showed its significance. A high-quality translation helps to shape an outstanding international image and boost the international publicity, vice versa. This paper studies the case of CRCC to analyze and explore the translation strategy from domesticating translation perspective, aiming to offer some insights to Chinese engineering enterprises in their international publicity promotion.

1. Introduction

In recent years, the overseas markets of Chinese enterprises have been expanding and China's international influence has been increasing, while the scale of Chinese enterprises' foreign contracting projects has also expanded especially after the introduction and implementation of the Belt and Road Initiative. According to statistics from the Ministry of Commerce, China's foreign contracting engineering business completed a turnover of $172.9 billion in 2019, up 2.3 percent year-on-year, with new contracts worth $260.25 billion, up 7.6 percent year-on-year①. From this statistic, it is obvious that the expansion of overseas markets of Chinese engineering enterprises is the trend, thus to better expand overseas markets, the international publicity work of engineering enterprises becomes particularly important.

As it is known, the translation of corporate international publicity materials can serve the enterprise's economic development and market development well, as well as for the benefit of its scientific and technological progress and foreign exchange and cooperation. Through the international publicity translation, the international competitiveness of the enterprise will be improved continuously. In addition, the international publicity translation can build a bridge for the enterprise to enter the international market, not only by publicizing the enterprise's excellent projects, products and business development advantages, but also effectively for the purpose of enhancing the enterprise's

① 1.http://data.mofcom.gov.cn/tzhz/forengineerstac.shtml

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international reputation (Tang Linnan. 2012: 4). As most of the overseas communications of engineering enterprises are conducted in English, corporate international publicity materials are the first-hand information for potential overseas customers to understand the company, so the quality of the English translation has a profound influence on the shaping of corporate image.

Therefore, this paper studies the case of China Railway Construction Corporation (CRCC) to analyze and explore the translation strategy from domesticating translation perspective.

2. Theoretical Basis

2.1 International Publicity Translation

"Corporate International Publicity Translation" refers to inter-language translation activities for corporate international publicity materials, the purpose of which is to publicize corporate information, products or services of the enterprise to overseas target language readers, to build a fine image of the enterprise overseas, to sell products or services produced by the enterprise to overseas customers, to realize the enterprise's benefits economically and socially(Xu Jun, Zi Zhengquan. 2020: 94).

2.2 Domesticating Translation

Domestication was proposed by Venuti in his book The Translator's Invisibility in 1995. According to Venuti, domestication is "an ethnocentric reduction of the foreign text to target-language cultural values, bring the author back home". In other words, domestication requires the translator to move closer to the target language readers and adopt the expressions used by the target language readers to convey the original content (Feng Qinghua, Chen Kefang. 2019: 10).

Since the purpose of corporate publicity is to better publicize its image, arouse overseas customers' interest in cooperation, and ultimately promote economic and social development, it is better to adopt the expressions used by overseas customers to promote the enterprise in the translation process of its publicity materials. If there are cultural differences and conflicts, the translator can, on the basis of respecting the main information in the original text, adopt a flexible and appropriate translation method according to the translation requirements and objectives, so as to eliminate cultural information rejection and conflicts, and narrow the psychological distance, to gain the psychological recognition of the readers and clear away the obstacles for the target language readers to accept the translation. (Zhang Xiaojing, Wang Yijiang. 2011: 118) Therefore, it is of great benefit to try to apply domestication translation strategy to the translation of publicity materials of engineering enterprises.

3. Specific Analysis

Most of the corporate publicity materials are translated into English word by word, which seems to be faithful to the original text, but in fact they might ignore the cultural differences between China and the West, causing poor publicity effect. As one of the "Fortune Global 500", China Railway Construction Corporation Limited (CRCC) embodies certain analytical value in its English translation of publicity materials. After comparing the official Chinese and English website versions of China Railway Construction Corporation Limited, it can be seen that although most of the company's publicity materials are translated word by word, there are still translation methods that can be used as reference.

Example 1: The Chinese and English website sections of China Railway Construction Corporation Limited are different. In the Chinese version, 13 sections are set up: "首页""企业概况""新闻中心""党建及群团工作""主营业务""科技创新""海外业务""法律合规""人力资源""社会责任""企业文化""投资者关系" and "信息公开". However, in the English website, there are only seven sections: "Home", "Profile", "News", "Business", "Overseas", "Investor" and "CSR".

By comparing the setting of the company's Chinese and English website sections, the author found that, compared with the allocation of the Chinese website sections, the allocation of the English website sections is more concise, and the details of "党建及群团工作" and "法律合规" with Chinese characteristics are not reflected in the English website. This is a domestication translation process after considering the cultural differences between China and the West, concise and clear, which is more convenient for readers to obtain the required information.

Example 2: In the Company Profile section of the website of China Railway Construction Corporation Limited, the Chinese text introduces the company's awards, such as "累计获国家科学技术奖 81 项，国家级勘察设计咨询奖 154 项，詹天佑土木工程大奖 101 项，国家优质工程奖 394 项，中国建筑工程鲁班奖 142 项；累计拥有专利 14023 项，省部级以上工法 3270 项"①, but after careful comparison of the English translation of this section, it is found that the English version has no such corresponding translation.

The author believes that this is because most of the time, overseas readers are not aware of the Chinese awards, and even if the names of these awards are trans-

① http://www.crcc.cn/col/col1569/index.html<2020-08-06>

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lated, there seems to be no comparative meaning. If they were translated one by one, it would affect the reading experience of the readers, and would not help with improving the image of the company. Therefore, companies tend to adopt a naturalization strategy and select key points for translation.

In addition, in the Business section of the website of China Railway Construction Company Limited, there is a big difference between the English and Chinese publicity materials introduced in the Equipment Manufacturing section. Obviously, the Chinese materials focus more on reflecting the morale of the enterprise, while the English materials focus more on reflecting factual information, such as the distribution of the production bases and the main business of the enterprise, as shown in Example 3 and Example 4.

Example 3: The Chinese material ends with " 中国铁建愿秉承 ' 诚信、创新永恒，精品、人品同在 ' 的企业价值观，与社会各界朋友精诚合作，互利共赢，共同促进我国装备制造行业发展，为建设和谐社会做出更大的贡献！ "[①] However, the English material ends with a brief introduction of China Railway Construction Heavy Industry Corporation Limited (CRCHI), a subsidiary of China Railway Construction Corporation Limited.

Example 4: The English starts with, "The production bases of CRCC Industry Plate are distributed in Beijing, Kunming, Changsha, Xi'an, Lanzhou, Urumqi, Changzhou, Wuxi and other regional core cities. The main business covers large railway track maintenance machinery, track construction equipment, tunnel boring machine, special construction equipment and electrified components and other industries. Its products are mainly for railway and urban rail transit new and existing railway reconstruction projects."[②] It introduces the distribution of the production bases, main business and the use of products of China Railway Construction Corporation Limited. The first paragraph of the Chinese version, however, gives a brief overview of the company with the sentence: " 中国铁建是集研发、制造、销售、服务为一体的国内领先、国际先进的施工装备制造商 "[③], and the whole article does not mention substantive information such as the distribution of the production bases.

The reason why it introduces like this is because of the different language styles between China and the rest of the world. The Chinese language is characterized by the fact that it is both virtual and real, and the wording in the articles on the websites of Chinese companies is exaggerated to some extent, while the language on the websites of overseas companies is more objective and stable, and it speaks in terms of facts and data, with detailed information to achieve the purpose of publicity and marketing (Liu Ying. 2011: 66). Therefore, adopting domestication strategy in publicity translation is better for companies to attract overseas customers.

4. Conclusion

The enterprise web page is essentially the electronic version of the enterprise's "resume" and is a powerful tool for the enterprise to publicize itself. (Wang Junchao. 2019: 62) Therefore, to do a more impressive job in English publicity of enterprises, it is necessary to fully consider the needs of the target language readers and then select appropriate translation strategies. However, through a brief analysis of the Chinese and English websites of China Railway Construction Corporation, we can understand that domestication strategy is very effective in translating similar texts. During translation, attentions should be paid more to the social function and purpose of the publicity translation, which is to publicize and carry forward the Chinese culture to the target language readers (Yuan Sen, Miao Yu. 2020: 23), and also to better reflect the advantageous image of the enterprise. Therefore, when doing a high quality job in the publicity translation of Chinese engineering enterprises, it is suggested to adopt the target language reader-centered domestication translation strategy.

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Research on the Impact of Financial Development on TFP——DEA-Malmquist Index and Hansen Threshold Model Based on Panel Data of Shandong Province, China

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ABSTRACT

Shandong's TFP growth is higher than Chinese average, but the growth rate has slowed in recent years, appearing the phenomenon that the growth momentum of Shandong's TFP is insufficient. Using DEA-Malmquist Index to measure Shandong's TFP growth rate, empirical research from the perspective of financial development finds that financial scale, efficiency of financial institutions, fiscal intervention, and scale of foreign capital utilization have significant nonlinear effects on the growth of TFP. Furtherly, through threshold analysis, the efficiency of financial institutions has a significant threshold effect on TFP growth. Financial scale and fiscal intervention are the main core variables that affect the growth of TFP under the threshold effect, and they have the same effect direction on TFP before and after the threshold value. However, the effect intensity of these two core variables on TFP is different.

1. Introduction

Since the Chinese Reform and Opening, China has become the world's second largest economy after about 40 years of comprehensive development under the background of its backward technology and low social productivity. In the past, relying on resource endowments and labor resources advantages, Chinese total economic growth momentum was rapid. Unfortunately, since the beginning of this century, the emergence of population aging has made demographic dividend of China disappear. Furtherly, the limited availability of natural resources has hindered China's economic development. The "factors-input" growth is no longer applicable to current economic development (Minjie Dong, Yongmei Liang, 2013) [1]. The development of China's economy will inevitably rely on technological progress and efficiency improvement in the future. How to accelerate the growth of TFP has become a critical subject, which needs to be studied urgently. With the development of modern economy, the status of finance in the national economy has become increasingly prominent. The expansion of the total amount of financial resources and the increase in types have made

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the economic benefits generated by financial development continue to increase, and the speed of social and economic growth has continued to accelerate (Qinxian Bai, 2000) [2]. From the perspective of the exploitation and utilization of financial resources, financial development can increase the level of TFP, thereby providing capital and technology for economic growth. It remains to be seen whether excessive intervention or suppression of financial development will hinder the process of the TFP's growth, slowing down economic growth. Explore, which urgently need further investigation.

Basically, under the established conditions of production factors, which were put into production, the additional benefits generated by technological progress contribute the most to economic growth (Robert M. Solow, 1957) [3]. What's more, with the development of the regional economy, the phenomenon that economic growth depends on the progress of TFP is obvious (Rioja F. and N. Valev, 2004) [4]. According to relevant researches, although a part of driving force has come from factor inputting, more importantly, the decisive driving force of China's economic growth in recent years has come from the improvement of TF (Gang Yi, Gang Fan, Yan Li, 2003) [5]. In addition to the proven factors affecting the growth of TFP,- such as technology level, the quantity and quality of labors, and the stability of social development (Chamarbagwala, Rubiana, 2006) [6] - financial development, fiscal decentralization, and the use of foreign capital also have a significant impact on China's TFP growth (Huiling Wang, Xiuyuan Peng, 2017) [7] (Hong Lei, 2019) [8]. In the process of economic development, financial development promotes industrial upgrading and optimization, and financial institutions guide capital to projects with higher yields, so that high-quality industries can obtain sufficient guarantee funds of technical innovation, which makes TFP and investment return rates will continue to increase. Theoretically, taking its advantage of the basic mechanism that affects the efficiency of capital allocation, finance improves capital structure, accelerates capital accumulation, and promotes technological innovation, which promote economic grow reasonably and rapidly. On the contrary, in fact, the development of finance may passively follow economic growth. In other words, there is no general conclusion between the both. Furthermore, the importance of financial development acting on economic growth might have been overemphasized (Yong Zhao, Da Lei, 2010) [9].

From the perspective of the economic cycle, financial development has a non-linear, "U-shaped", relationship with TFP growth. When financial development exceeds the "U-shaped" bottom threshold value, the further development of finance will significantly promote the growth of TFP [10]. In the economic contraction stage, financial development has a restraining effect on the growth of TFP. Yet, in the economic expansion stage, financial development encourages the growth of TFP. That is to say financial development has a "threshold effect" on the growth of TFP. After the threshold value is crossed, financial development promotes the growth of total factor productivity. But when financial development is below the threshold value, the growth of TFP is more dependent on other growth source.

Under the requirements of the era of high-quality economic growth and supply-side structural reforms, Shandong Province, China has transferred its own advantages to focus on building a new model of "blue and yellow-economy" development. Although it has achieved remarkable rewards in recent years, there are still some economic and social issues, for example, inefficient use of financial funds, the not yet complete financial institution system, and the problem of overcapacity in the old industries. Taking into account analysis above, this paper studies the impact mechanism of financial development acting on TFP, during the process that exploring whether financial development has a "threshold effect" on the growth of TFP in Shandong Province, China. Above all, using DEA-Malmquist index method, measure the TFP growth rate of Shandong Province and other provinces across China, to make horizontal and vertical comparisons. And then, based on the Hansen threshold model, a comprehensive analysis of the impact mechanism of Shandong Province's financial development indicators on the growth of TFP is carried out. The ultimate goal of this paper is, from the perspective of finance development, to provides references for the further TFP growth of the regions whose situations are similar to Shandong Province, China.

2. Measurement of TFP Based on DEA-Malmquist Index Method

2.1 Construction of Theoretical Model

Based on the distance function, set the Malmquist index, which refers to the technical function- TECHNOLOGY(t)- in the t period and the t+1 period.

$$Malmquist_t\left(X_t, Y_t, X_{t+1}, Y_{t+1}\right) = \frac{dis\tan e_{\ t}\left(X_{t+1}, Y_{t+1}\right)}{dis\tan e_{\ t}\left(X_t, Y_t\right)} \quad (1)$$

Among them, (X_t, Y_t) is the combination vector of factor input and total output, and $distance_t$ is the distance

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function with reference to TECHNOLOGY(t). In order to, referring to the method of Caves et al. (1982) [11], the geometric average value of formula (1) is used to measure the TFP growth rate, to reduce the fluctuations caused by selection of the time span of the time series data.

$$TFP = \left[Malmquist_t\left(X_t, Y_t, X_{t+1}, Y_{t+1}\right) \bullet Malmquist_{t+1}\left(X_t, Y_t, X_{t+1}, Y_{t+1}\right)\right]^{\frac{1}{2}} \tag{2}$$

Incorporating formula (1) into formula (2), obtain the calculation model of TFP growth rate.

$$TFP = \left[\frac{dis\tan e_{\ t}\left(X_{t+1}, Y_{t+1}\right)}{dis\tan e_{\ t}\left(X_t, Y_t\right)} \bullet \frac{dis\tan e_{\ t+1}\left(X_{t+1}, Y_{t+1}\right)}{dis\tan e_{\ t+1}\left(X_t, Y_t\right)}\right]^{\frac{1}{2}} \tag{3}$$

Drawing lessons from the research of Goldsmith and Levine (1997) [12], it is the scale indicators of financial development and the efficiency indicators of financial institutions that are incorporated into the model, to construct a model used to value economic growth. Based on the "Snow model", construct a model of the impact of financial development on economic growth, which incorporate financial scale, efficiency of financial institutions, fiscal intervention, and scale of foreign capital utilization into the multiple combination function of technological progress.

$$Y_{i,t} = A_{i,t}\left(scale_{i,t}, efficiency_{i,t}, finance_{i,t}, fdi_{i,t}\right) \bullet f_{i,t}\left(K_{i,t}, L_{i,t}\right) \tag{4}$$

After introducing the random error term, divide $f_{i,t}$ ($K_{i,t}$, $L_{i,t}$) on both sides of the equation (4), and then take the logarithm to get the theoretical model.

$$\ln\frac{Y_{i,t}}{f_{i,t}\left(K_{i,t}, L_{i,t}\right)} = \beta_0 + \beta_1 \ln VB_{i,t} + \beta_2 \ln LB_{i,t} + \beta_3 \ln FIV_{i,t} + \beta_4 \ln FIL_{i,t} + \beta_5 \ln FE_{i,t} + \beta_6 \ln FDI_{i,t} + c \tag{5}$$

After further deformation, the measurement formula of this chapter is obtained.

$$\ln TFP_{i,t} = \beta_0 + \beta_1 \ln VB_{i,t} + \beta_2 \ln LB_{i,t} + \beta_3 \ln FIV_{i,t} + \beta_4 \ln FIL_{i,t} + \beta_5 \ln FE_{i,t} + \beta_6 \ln FDI_{i,t} + c \tag{6}$$

2.2 Regression Estimation of DEA-Malmquist Index

Through the DEA-Malmquist index model, the TFP growth rate of Shandong Province, China from 2003 (base year) to 2017 is calculated.

Table 1. Summary of DEA-Malmquist Index in Shandong Province, China from 2003 to 2017

Index / Year	Technical Efficiency Index	Technology Progress Index	Pure Efficiency Index	Scale Efficiency Index	TFP Growth Rate Index
2003	1.000	1.000	1.000	1.000	1.000
2004	1.069	1.026	1.068	1.001	1.097
2005	0.967	1.059	0.967	1.000	1.025
2006	1.039	1.031	1.039	1.001	1.072
2007	1.007	1.029	1.007	1.000	1.036
2008	1.029	1.036	1.028	1.000	1.066
2009	1.005	1.018	1.005	1.000	1.023
2010	0.986	1.007	0.986	1.000	0.993
2011	0.979	0.980	0.979	1.000	0.959
2012	1.001	0.982	1.001	1.000	0.984
2013	1.154	0.784	1.213	0.952	0.906
2014	0.997	1.007	1.000	0.997	1.005
2015	1.015	1.072	1.000	1.015	1.089
2016	0.986	1.119	1.000	0.986	1.103
2017	0.995	0.856	1.000	0.995	0.852

Using the same principle, calculate the 2003-2017 TFP growth rate of other 30 provinces, municipalities, and autonomous regions in China except Shandong Province.

Table 2. Summary of 2013-2017 TFP growth rate of China's provinces, municipalities, and autonomous regions

Area / Year	2013	2014	2015	2016	2017
Beijing City	0.984	1.014	1.094	1.108	0.845
Tianjin City	0.956	1.009	1.075	1.126	0.879
Hebei Province	0.909	0.951	1.058	1.117	1.025
Shanxi Province	0.885	0.940	1.025	1.053	0.985
Inner Mongolia Autonomous Region	0.890	1.018	1.084	1.103	0.762
Liaoning Province	0.894	1.003	1.114	0.898	0.921
Jilin Province	0.888	0.987	1.061	1.078	0.836
Heilongjiang Province	0.931	1.001	1.064	1.066	0.844
Shanghai City	0.959	1.025	1.135	1.169	0.867
Jiangsu Province	0.721	0.973	1.115	1.145	0.883
Zhejiang Province	0.983	0.983	1.109	1.141	0.877
Anhui Province	0.885	0.983	1.087	1.127	0.891
Fujian Province	0.972	0.998	1.076	1.111	0.874
Jiangxi Province	0.902	0.973	1.048	1.119	0.852
Henan Province	0.855	0.981	1.059	1.089	0.873
Hubei Province	0.887	0.993	1.071	1.096	0.869
Hunan Province	0.938	0.999	1.083	1.101	0.837
Guangdong Province	0.851	0.992	1.072	1.080	0.868
Guangxi Zhuang Autonomous Region	0.902	0.987	1.063	1.096	0.790
Hainan Province	0.910	0.983	1.067	1.091	0.863
Chongqing City	0.921	1.011	1.112	1.144	0.870
Sichuan Province	0.835	1.023	1.080	1.114	0.880
Guizhou Province	0.957	1.022	1.120	1.105	0.882
Yunnan Province	0.959	1.007	1.078	1.078	0.857
Tibet Autonomous Region	0.908	1.001	1.095	1.148	0.842
Shanxi Province	0.868	0.983	1.034	1.085	0.885
Gansu Province	0.867	0.962	1.003	1.066	0.845
Qinghai Province	0.941	0.980	1.058	1.071	0.809
Ningxia Hui Autonomous Region	0.917	0.957	1.074	1.136	0.869
Xinjiang Uygur Autonomous Region	0.945	0.986	1.007	1.046	0.862

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Based on the above calculation and analysis, a comparison chart of the growth trend of TFP between Shandong Province and the China's average is drawn.

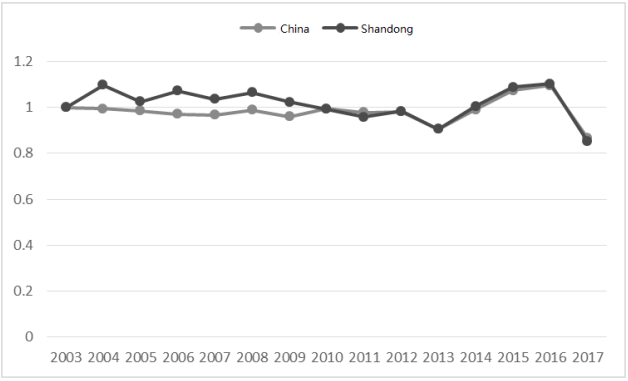

Figure 1. The growth rate of TFP across China and Shandong Province from 2003 to 2017

It's shown that since 2003, TFP growth rate of Shandong Province has been ahead of the national average. However, since 2010, the speed of Shandong's TFP growth rate has slowed down, and sometimes even lower than the national average growth rate. After a four-year growing period from 2013 to 2016, the growth rate of TFP in both the China's average and Shandong Province fell to about 0.8 point in 2017, which shows the characteristics of insufficient growth momentum of TFP.

3. Analysis on the Growing Effect of Financial Development's Influence on TFP

3.1 Variable Setting and Data Processing

Table 3. Selection list of indicators and variables

Indicators	variables
Total economic output (Y)	Real GDP
Labor factor input (L)	Employed population
Capital factor input (K)	Capital stock
Financial scale (scale)	Total face value of currency, deposits and circulating financial instruments (vb, lb)
Efficiency of financial institutions (efficiency)	Total current account of financial institutions (fiv, fil)
Fiscal intervention (finance)	Total current account of financial institutions (fe)
Scale of foreign capital utilization (fdi)	Total current account of financial institutions (fdi)

Among the indicators and variables, the conversion of real GDP is obtained by price deflation based on the GDP price deflation index of 1978 as the base year. For the technical treatment of the capital stock, the perpetual inventory method is used for calculation- defining 2003 as the base year, firstly, the fixed asset investment (I) is converted into a constant price in 2005 using the fixed asset investment price index. Secondly, referring the method of Haojie Shan (2008) [13], calculate the base year's capital stock ($K_{2003}=I_{2004}/(\eta+\delta)$). Among them, η is the average growth rate of fixed assets from 2003 to 2017, and δ is the depreciation rate, which is 9.6% according to the study result of Jun Zhang et al. (2004) [14]. After all, calculate the capital stock of each year ($K_{t+1}=(1-\delta)K_t+I_{t+1}$) through the perpetual inventory method.

3.2 Data Source and Statistical Description

GDP and GDP price index of each province comes from National Bureau of Statistics of China, and the GDP of each city in Shandong Province comes from the statistical yearbook of each place. Part of the data of the employed population of each province comes from the China Labor Statistics Yearbook, and that of each city in Shandong Province comes from the statistical yearbook of prefectures and cities. The fixed asset investment amount and fixed asset investment price index of each province come from the China Economic Statistics Database, and the same variables of each city in Shandong Province come from the EPS Statistical Database. Both total face value of currency, deposits and circulating financial instruments and the total amount of current accounts of financial institutions in all cities in Shandong Province are derived from Shandong Statistical Yearbook, Shandong Financial Statistical Yearbook and annual audit reports of financial institutions. Local fiscal expenditures are derived from local cities' Financial Statistics Yearbook, and the total amount of foreign capital utilization comes from the China Economic Statistics Database.

The selected time span of the variables is from 2003 (base period) to 2014, with a total of 31 observation targets, that nominal GDP, fixed asset investment, price index, and employed population of all provinces, municipalities and autonomous regions across China. The statistical characteristics are as follows.

Table 4. Statistical description of total output and input factors of production

Vars	Mean	Median	Max	Min	Standard Deviation
Real GDP	14885.13	10823.01	89705.23	185.09	14933.03
GDP price deflation index	535.61	544.62	660.59	380.67	89.99
Fixed asset investment	9736.52	6352.70	55202.72	133.96	10027.41
Fixed asset investment price index	102.60	102.16	113.28	96.00	3.27
Employed population	461.63	402.02	1973.28	17.37	329.25

The selection time span of the variables of Shandong Province is from 2004 to 2017, a total of 14 years, that fi-

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nancial scale, efficiency of financial institutions, financial intervention, and scale of foreign capital utilization. The observations are 17 prefecture-level cities in Shandong Province, China, a total of 17 groups. As follows are the statistical characteristics of the variables.

Table 5. Statistical description of variables of panel regression and threshold regression

Vars	Mean	Median	Max	Min	Standard Deviation
ln TFP	1.7471	1.7499	2.2879	0.8176	0.2575
ln VB	16.7115	16.7435	18.9251	14.2922	0.9416
ln LB	15.8166	16.2640	18.7845	5.7389	2.5252
ln FIV	16.0770	16.0088	18.8500	13.9705	1.0114
ln FIL	15.7839	15.6875	18.6469	13.6961	1.0196
ln FE	13.6233	13.6540	16.2365	11.5772	0.9537
ln FDI	9.6920	9.7319	13.2490	2.5649	1.4850

3.3 Regression of Panel Data Model

Based on the theoretical model set above, regression estimates are made on the multiple effects of financial scale, efficiency of financial institutions, fiscal intervention, and scale of foreign capital utilization acting on TFP. The results are as follows.

Table 6. List of regression results of panel model

		Dependent variable: ln TFP		
Independent variables	(1)	(2)	(3)	(4)
ln VB	0.040	-0.107	-0.109	-0.095
	(0.020)	(0.052)	(0.053)	(0.053)
ln LB	0.032	0.026	0.028	-0.029
	(0.011)	(0.010)	(0.010)	(0.010)
ln FIV		0.692	0.647	0.620
		(0.126)	(0.145)	(0.146)
ln FIL		-0.551	-0.550	-0.572
		(0.118)	(0.120)	(0.120)
ln FE			0.043	0.066
			(0.060)	(0.061)
ln FDI				0.030
				(0.018)
Intercept	0.569	0.713	0.811	0.759
	(0.354)	(0.330)	(0.359)	(0.364)
Number of observations	238	238	238	238
R-sq	0.251	0.394	0.352	0.361

Through the regression estimation of the panel model, it is found that, under the sole impact of the financial scale, the financial scale promotes the growth of TFP, but, under the combined effect of other factors, financial scale plays a restraining effect, which shows that the impact of financial scale on TFP is affected by other factors, such as efficiency of financial institutions, fiscal intervention, and foreign capital. What's more, it is the asset business of financial institutions that has a restraining effect on the growth of TFP, which shows the current financial institutions' allocation of funds, risk diversification, and control of investment yields do not serve technological innovation well. In addition, fiscal intervention and foreign capital have an incentive effect on the growth of TFP. That is to say, fiscal intervention has played a role in supporting the growth of TFP, and foreign capital also positively promotes TFP through the domestic financial market.

4. Threshold Effect of Financial Development on TFP

4.1 Regression Estimation of Threshold Model

Related studies have found that there may be structural mutations in the effect of financial development on TFP growth, that is, there may be a certain non-linear relationship. Further research has found that financial development has such a threshold effect on TFP, and the threshold values of different observation objectives are hard various. According to Hansen Panel Threshold Model, the model hypothesis of this chapter is proposed.

$$TFP_{i,t} = \mu_i + \beta_1' X_{i,t} \bullet I(q_{i,t} \le \gamma) + \beta_2' X_{i,t} \bullet I(q_{i,t} > \gamma) + \varepsilon_{i,t} \quad (7)$$

Among the symbols, I is the indicative function, q is the threshold variable, γ is the threshold value, and ε obeys probability distribution independently and identically. Taking the above theoretical model assumptions as a basis, financial scale, efficiency of financial institutions, fiscal intervention, and scale of foreign capital utilization are defined as threshold variable individually in the following section, and threshold effect analysis is carried out.

Divide the section into 400 parts, and bootstrap sampling 200 times. After defining threshold variables individually, the remaining three variables are as core explanatory variables affected by threshold variables, and furtherly, the model is single threshold. Eliminating 1% of abnormal results, the threshold estimator and its confidence interval are regressed.

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Table 7. Threshold estimation and confidence interval regression results

Threshold estimator (Level=95)			
Model	Threshold	Lower	Upper
Th-1	3.2428×10^{7}	2.5451×10^{7}	3.9540×10^{7}

The estimated value of the threshold effect is 3.2428×10^{7}, and the confidence interval is the upper and lower limits of 95%. The significance test of the threshold effect was carried out, on the threshold variable and the core variables affected by the threshold variable respectively, which is found that the threshold effect test is not significant when the financial scale, fiscal intervention, and scale of foreign capital utilization are used as the threshold variable. The threshold effect is only the most significant, when the efficiency of financial institutions is used as the threshold variable, and financial scale and fiscal intervention are respectively as the core variables affected by the threshold variable. The threshold effect test value is as follows.

Table 8. Summary of threshold effect test values

Threshold effect test (bootstrap=300)							
rX	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
scale	1.10×10^{5}	766.85	112.03	0.00	16.22	19.07	33.44
finance	1.17×10^{5}	815.51	91.65	0.00	25.91	31.91	44.61

According to the significance test of the threshold effect, we can see that the threshold effect test statistics are estimated to be 1.10×10^{5} and 1.17×10^{5}, which are far greater than the upper confidence limits that 10%, 5%, and 1% (RSS>>Crit10, RSS>>Crit5, RSS >>Crit1). Simultaneously, the P value is 0, indicating that the threshold effect is significant. Based on the above analysis, the regression estimation of the fixed effects threshold model is carried out.

Table 9. List of regression estimation results of threshold model

Threshold variable: efficiency	Dependent variable: TFP	
	Core explanatory variables	
	scale	finance
scale	No threshold effect: 0.0546465 (0.0130583)	0.0078849 (0.0070515)
	Threshold effect: 0.095521 (0.0148566)	
efficiency	0.000013 (2.13×10^{-6})	0.000004 (0.000001)
finance	6.35×10^{-7} (7.00×10^{-7})	No threshold effect: 4.96×10^{-7} (7.3910^{-7})
		Threshold effect: 0.0000521 (5.75×10^{-6})
fdi	-0.003565 (0.0001356)	-0.0010016 (0.0001592)
Intercept	242.4392 (6.968664)	263.6385 (7.456707)
R-sq	0.5546	0.4988

The results of threshold regression estimation found that efficiency of financial institutions has a significant threshold effect on TFP growth, and it is financial scale and fiscal intervention that are the main influencing factors in the threshold effect. With the improvement of the efficiency of financial institutions, financial scale has also increased its role in the growth of TFP, indicating the flow of funds to entities for technological innovation lays on the improvement of efficiency of financial institutions. What's more, as the efficiency of financial institutions crosses the threshold value, the role of fiscal intervention in promoting TFP has also been strengthened, indicating financial institutions can effectively transfer fiscal expenditures to enterprises, through the financial market, which allows enterprises to carry out technological upgrades and innovations, thereby enhancing TFP growth rate.

4.2 Robustness Test

In order to test whether there are significant differences between individuals in time and cross-section, this chapter analyzes the sample individuals longitudinally and horizontally by setting the F statistic, thereby determine whether the model is a mixed effect or an individual fixed effect is more reasonable and effective. The F statistic is constructed by the ratio of the residual sum of squares of the unrestricted regression model and the restricted regression model. The following assumptions are made for the F statistic.

H_0: The intercepts of different individuals are the same (the real model is a mixed regression).

H_1: Individuals have different intercept terms (the real model is an individual effect regression).

The formula of F statistic is following.

$$F=\frac{(RRSS-URSS)/(N-1)}{URSS/(NT-N-K+1)}\sim F(N-1,N(T-1)-K+1) \tag{8}$$

Among these symbols, RRSS is the residual sum of squares of the mixed effects regression model, URSS is the residual sum of squares of the individual fixed effects regression model, N is the sample size, and K is the number of estimated parameters in the unconstrained model. If the null hypothesis H_0 holds, the statistic F obeys the F distribution with degrees of freedom (N-1, N(T-1)-K+1).

The regression estimation result of the mixed effects model is as follows.

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lnTFP=0.62-0.12lnVB+0.01lnLB+0.58lnFIV-0.38lnFIL-0.04lnFE+0.02lnFDI

(2.00) (-3.36) (1.08) (5.40) (-4.16) (-0.74) (1.55)
R^2=0.25, SSEr=11.50347 (9)

From the above, it can be seen that the residual sum of squares of the mixed effects model is RRSS=SSEr=11.50347.

The regression estimation result of the individual fixed effects model is as follows.

LnTFP=1.24-0.07lnVB+0.04lnLB+0.69lnFIL-0.79lnFIV+0.17lnFE+0.02lnFDI+0.04D_1+0.27D_2+…+0.16D_{17}

(2.43) (-1.40) (2.72) (4.11) (-5.41) (2.22) (1.19)
R^2=0.49, SSEr=7.829949 (10)

In the formula (10), the definition of dummy variables D_1, D_2, ..., D_{17} is following.

$$D_i \begin{cases} 1, & D_i \text{ belongs to the } i^{th} \text{ sample individual } (i = 1, 2, \ldots, 17) \\ 0, & \text{Else} \end{cases}$$

From the regression result, it can be seen that the residual sum of squares of the individual fixed effects model is URSS=SSEr=7.829949.

According to formula (8), F=8.41 F~F(13, 238), F=8.41>$F_{0.05}$(13,238)=1.792. Therefore, the impact mechanism of financial development acting on TFP is such an individual fixed effect model, which shows that the effect of financial development in Shandong Province, China on the growth of TFP is more significantly affected by different regions than it is affected by time factor. In other words, the financial development of various cities in Shandong Province, China is uneven, and there is a relatively large gap in the role of finance in the growth of TFP between cities of Shandong. It causes that, under the influence of regional factors, finance promotes TFP growth significantly more than economic cycle factor.

5. Conclusions and Recommendations

5.1 Main Conclusion

Firstly, Shandong Province's TFP is higher than the Chinese national average, but in recent years the growth momentum has been insufficient, with uneven development among cities of Shandong. Since 2010, the gap between Shandong's TFP growth rate and that of Chinese national average has gradually decreased, or even converged, showing the characteristics of lagging growth. In order to achieve the goal, that high-quality regional economic growth, Shandong Province, China not only needs to consolidate the driving role of the source of TFP growth, but also maintain the gap in the role of finance in promoting TFP growth among cities.

Secondly, it is efficiency of financial institutions that has a significant threshold impact on Shandong's TFP, but that of financial scale, fiscal intervention, and scale of foreign capital. When efficiency of financial institutions is defined as the threshold variable, financial scale and fiscal intervention are the main explanatory variables, which have a positively significant threshold impact on the growth of TFP. That's to say, the TFP of Shandong Province, China is non-linearly affected by the efficiency of financial institutions, where financial scale and fiscal intervention play a major role in TFP.

Thirdly, the financial scale has a positive effect on TFP before and after the efficiency of financial institutions reaches the threshold value, but the strength after the threshold value is greater than before. That shows, when the regional financial scale is underdeveloped, relying solely on the growth of financial scale will increase investable capital and promote the growth of TFP. Fortunately, as the regional financial institution system continues to mature, the scale of financial institutions will lead to the strengthening of the functions of financial institutions, the efficiency of financial institutions will be improved, and the degree of effect on TFP will also be strengthened.

Finally, fiscal intervention also promotes TFP growth, and its impact will increase after efficiency of financial institutions reaches the threshold value, which shows fiscal intervention can support the growth of TFP when the regional financial institution system is not fully sound or low in efficiency, but the intensity is not visible. After only being improved, efficiency of financial institutions will promote the intensity of fiscal intervention to TFP growth, such as local bonds or state-owned enterprise investment and financing, through capital allocation and risk diversification of financial institutions.

5.2 Related Suggestions

The research results of this paper show that, in order to play the role of financial development in promoting the growth of TFP, not only is it necessary to increase financial scale, but to coordinate financial development and fiscal intervention. To have sufficient liquidity in the financial market, the purpose for that is to meet the needs of investment and financing of enterprises, improving the services of financial institutions, and to enhances

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the ability of financial services to satisfy the entities' innovation and creation. Otherwise, to achieve the maximum impact on TFP growth, it is imminent to adjust the structural relationship between financial development and fiscal intervention in different economic periods, timely and scientifically. However, in recent years, the TFP growth momentum of Shandong Province, China has been insufficient. Hence, at present, Shandong Province, China and other regions with similar characteristics are supposed to take parallel measures simultaneously, to deepen financial development and financial liberalization, alleviate financial repression, and promote inclusive finance. In order to achieve smooth economic transformation and high-quality growth, promote the formation of a healthy financial ecology, and strengthen the positive impact of financial development on the growth of TFP

First, although the total financial scale of Shandong Province, China is large, there are still some problems, such as homogenization of financial instrument types and unitary structure of financial institutions. Similar types of financial instruments and single structure financial institutions are combined into a range of financial structures with the same characteristics, which creates troubles for companies that a single structure of investment and financing, and higher financing risks, resulting in inaccurate capital flow direction and capital maturity. Due to the nature, some financial funds are left idle, deposited, and even become bad assets. In the future, regions with similar characteristics should focus on expanding the types of financial instruments, optimizing the financial structure, and forming a multi-level, multi-structure, and multi-featured financial structure, to revitalize the accumulated capital that has ever been bad assets. Second, the financing structure of physical enterprises in Shandong Province is mostly indirect financing by commercial bank credit business, which inhibits other financial intermediaries. Not only does the unity of the financial intermediary system fail to adopt the demand of technological innovation input, in the upgrading of enterprises, but increases the financing risks of enterprises, which causes the increasingly anxious problem of financial restraint. In the future, Shandong Province, China and regions with similar characteristics should aim to optimize the financial intermediary system, whose specific measures are appropriately loosening controls on capital flows, rationally adjusting the scope of implementation of the guiding credit plan, reducing financial institution approval restrictions, and deepening the development of financial liberalization, to improve the efficiency of financial institutions in serving entities. In addition, to provide enterprises with diversified financing channels, while allocating funds through credit rationing, efforts should be urgently made to promote the construction of direct financing markets. Third, although Shandong Province, China has a relatively large economic aggregate, the proportion of small or medium-sized enterprises is far more than that of large-scale enterprises. To accelerate the growth of TFP in the whole society, the basic role of small or medium-sized enterprises must cannot be ignored. However, recently, as some financial institutions have closed the branch structure of lagging cities in order to save costs in some cities of all over the world in the same situation, the requirement of financing threshold for small or medium-sized enterprises has become higher and higher, which has created obstacles for small or medium-sized enterprises in terms of innovation investment and spatial layout. Then, in the process of deepening the structural reform of the financial supply side, Shandong Province, China should strengthen the protection of small or medium-sized enterprises, encourage and urge financial institutions to reduce the financing constraints on the innovative investment, promote the construction and development of inclusive finance, and use the power of fiscal intervention to support the TFP of whole regional society in a timely manner. What's more, regions with similar characteristics rest of the word can also accept the same policy suggestions.

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Research on Inventory Pledge Financing Pledge Decision under Internet of Things Technology

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ABSTRACT

Inventory pledge financing not only solves the financing difficulties of small and medium-sized enterprises, but also opens up business channels for banks. Under the random market demand, this article studies the pledge decision-making of perishable pledges in the inventory pledge business, On the basis of considering the supervision of the Internet of Things technology to reduce the loss rate of quality goods, a decision model of the pledge rate of the bank is constructed in the case of not adopting the Internet of things technology and adopting the Internet of things technology. The pledge rate decision-making model in the two technical situations aims at maximizing the profit at the end of the pledge period. The factors in the model such as the pledge rate, end-of-period income, and IoT technology coverage rate are analyzed respectively, and finally the decision-making process is verified through calculation examples. Studies have shown that, when Internet of Things technology is not adopted, the income of bank pledge business first increases and then decreases with the growth of pledge rate. After the adoption of Internet of Things technology, the income of Banks is inversely proportional to the coverage rate of Internet of Things technology. However, within a certain coverage range, Banks can obtain greater income by using Internet of Things technology to supervise pledges.

1.Introduction

Small and medium-sized enterprises are an important part of the modern national economy and have a broad social and economic foundation. Therefore, the number of such enterprises in china has an absolute advantage. By the end of 2019, the total number of small and medium-sized enterprises nationwide in china was 15,278,400. Among them, there are 11,698,700 small and medium enterprises, accounting for 76.57% of the number of enterprises. After 44,362,900 individual businesses were included in the statistics, the proportion of small and medium-sized enterprises reached 94.15%. Small and medium-sized enterprises are the basic force that promotes employment, improves people's livelihood, stabilizes society, develops the economy, and promotes innovation. They are the largest and most dynamic group of enterprises that constitute the main body of the market economy. The development status of SMEs is related to the adjustment of China's economic and social

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structure and the transformation of development mode, the promotion of employment and social stability, and the technological innovation and transformation and upgrading[1]. Although small and medium-sized enterprises have made remarkable achievements, the narrow financing channels, small scale, weak strength and poor ability to withstand risks have caused financial institutions to face large risks in loans to small and medium-sized enterprises, making small and medium-sized enterprises face financing difficulties, slow financing, and high cost. In today's fiercely competitive environment, in order to better serve downstream customers, small and medium-sized enterprises often have a large backlog of inventories, occupy a large amount of capital, and slow capital turnover, which affects production and operation. The 2015 "13th Five-Year Plan" proposes to implement financial system reforms and improve the financial market system to promote inclusive finance to promote the recovery of the real economy. As a typical form of logistics finance, the inventory pledge financing business has become an effective way to solve the financing dilemma. Inventory pledge financing means that the borrower enterprise uses its movable property as a guarantee to pledge to the fund provider such as the bank, and at the same time, transfer the pledge to The business activities of a logistics company (intermediary) that has the legal qualification for safekeeping of movable properties to obtain loans[2]. Compared with the traditional loan business, the inventory pledge business is to pledge excess inventory to financial institutions, paying more attention to the pledge, rather than just focusing on the size and capital of the enterprise. This business can firstly enable SMEs to get rid of financing difficulties caused by insufficient credit ratings and guarantees, and use inventory to solve funding difficulties. Secondly, third-party logistics companies can participate in obtaining more customer resources and consulting and regulatory business benefits. Financial institutions have expanded their business scope. Get a fat profit [3].

In this paper, we will establish two pledge rate decision-making models under the traditional supervision of banks and the use of Internet of Things technology to analyze the decision-making and optimal benefits of the loss of pledged materials. The structure of other parts of this paper are as follows:The section 2 is a literature review of inventory Staking and Internet of Things, the section 3 is the problem description and symbol explanation, the model establishment are stated in Section 4, Section 5 validates the model with an example. Finally, a conclusion is provided in Section 6.

2. Literature References

The inventory pledge business meets the needs of the economy and society and has developed rapidly in the early stages of development. It has also attracted a large number of domestic and foreign scholars to study the business, including research on the inventory pledge business model, pledge rate setting, and loss rate reduction. For example, Poe explained an important model in logistics finance, namely, asset-based financing. It is believed that the collateral that must be considered for pledge financing of inventory and accounts receivable, enterprises at all levels should be considered for financing business[4].Wright analyzed the value of inventory in logistics finance, and believed that it was related to market fluctuations and various factors of financing companies, and proposed that the participation of third-party logistics companies can bring new protection to financing business[5].Yixue Li and others studied the development process of inventory pledge business at home and abroad, analyzed the environmental factors and legal system factors of the development of inventory pledge business from the perspective of logistics and finance, and put forward corresponding countermeasures for the development of inventory pledge business in china[6]. In terms of pledge rate, Cossin et al. relaxed the assumption of the endogenous probability of default, and obtained a pledge rate consistent with the bank's risk tolerance based on the exogenous probability of default[7]; On this basis,Yixue Li continued to use simplified thinking, and comprehensively considered the influence of bank risk preferences, price fluctuations, and mark-to-market cycles, established a decision model for the pledge rate of inventory financing business[8].Hui Yu considers the endogenous default and uncertain demand to establish a single-period newsboy model to study the decision-making problem of pledge rate[9].Qinhong Zhang and others analyzed the pledge rate decision-making problem when the risk attitude of decision-making subjects is different under the random condition of the pledge market demand[10]; In terms of studying the loss of pledges, Yan Shi and others established a production inventory model of perishable items under the inventory pledge financing strategy, taking into account the loss of pledges[11]; Under the random fluctuations of inventory demand, Yongming Pan and others consider the impact of inventory loss on decision-making during the inventory pledge process, the bank's lower risk control and the enterprise's ability to repay loans to establish a bank profit maximization model[12]; Yunfeng Zhang and others studied inventory pledge financing under the consideration of the loss of

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pledges, derived the influence of incentive levels on the level of supervision efforts and expected returns under the three modes of entrusted supervision, joint operation and unified credit, and further studied the investment needs of SMEs after financing Inventory pledge decision model[13-14].

To sum up, the research results on the inventory pledge financing business are quite rich, but in terms of the loss of pledged goods, the inevitable loss of pledged inventory will affect the expected income of all parties involved in the business. There are documents that mostly use financial institutions to incentivize third-party logistics companies, thereby reducing the pledge rate of pledged inventory.However, with the rapid development of the information technology industry today, the rapid development of Internet of Things technology has provided new solutions for improving the level of supervision of the inventory pledge business and reducing the inventory loss rate. For example, Yongzhang Gong combines supply chain finance with the Internet of Things technology, and monitors all links in the pledge supervision process through the Internet of Things to ensure the smooth progress of the inventory pledge business[15]; Lingyan Jiang and others used the Internet of Things technology to prevent repeated pledge risks, and established a model to analyze the changes in the income of banks and third-party logistics companies before and after the adoption of the Internet of Things technology[16]. However, the literature in this area has not yet involved the use of Internet of Things technology to improve the level of supervision to reduce the loss of pledged goods. In view of this, this article focuses on the large and easily lossy pledge inventory, and considers using Internet of Things technology to improve the supervision level of third-party logistics companies to promote The reduction of the loss rate, based on this, discusses the decision-making optimization problem of the pledge rate in the inventory pledge financing business.

3. Problem Definition

At the beginning of the pledge period, the financing company submits an inventory pledge financing application to the bank, and delivers the inventory to the third-party logistics company. The bank evaluates the pledge rate and sets the pledge rate to the company to lend money. Third-party logistics companies supervise the pledges, but due to the information asymmetry between the supervising companies and the banks, the supervising companies may have a high rate of loss of pledges due to their own negligence and improper storage during the supervision process, resulting in the loss of bank pledges. Pledge supervision risks arise. During the pledge process, the bank uses the IoT pledge supervision platform to monitor the dynamics of pledges in an all-round and full process, realizing real-time supervision of the position, status and ownership of the pledges. In order to improve the level of supervision of third-party logistics companies, SMEs at the end of the pledge period choose whether to repay the loan according to their own wishes and market demand. If the company chooses to default, the bank will deal with the inventory and obtain benefits. (see Figure.1)

In order to better study the problem, we need to assume:

(1) Banks and small and medium-sized enterprises have symmetrical information. At the end of the pledge period, banks and financing companies have the same ability to handle pledged inventory.

(2) The pledged inventory will be lost during the pledge process; banks and third-party logistics companies have asymmetric information about the supervision of pledges.

(3) The market demand fluctuates randomly and obeys a certain distribution, and the unit price of the pledged inventory is stable during the pledge period.

(4) At the same time, consider the endogenous default rate and exogenous default rate of the financing enterprise, and default behavior occurs when both occur simultaneously.

(5) The supervision cost of logistics companies consists of two parts: the labor supervision cost of third-party companies that do not use the Internet of Things technology and the input cost of the supervision of the Internet of Things technology. The higher the coverage, the more the sensing devices, detection devices, tags, etc. Increase in the cost of IoT supervision.

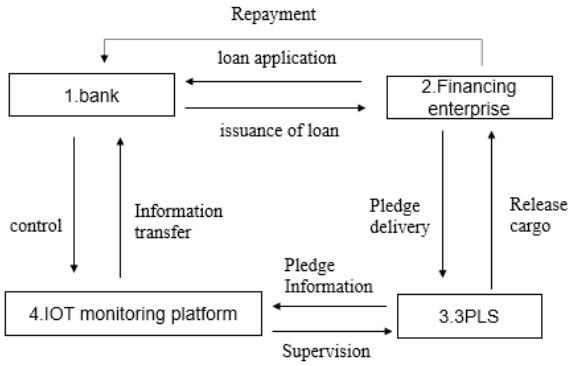

Figure 1. Inventory pledge financing flow chart

4. Model

In this section, we will establish a pledge rate model for banks with and without IOT technology for analysis

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and comparison. First give a summary of the symbols to be used in the model（See Table 1）

Table 1. Meaning of model index/parameters/decision variable

Symbol	Description	Symbol	Description
q_0	Quantity of pledge at the beginning of pledge period	u	The collateral market demand at the end of the period, the distribution function is $F(x)$,The probability density function is $f(x)$, $u \geq 0$
P	The unit price of the pledge, the price remains unchanged within a shorter pledge period $p>0$	g	End-of-period processing price of remaining inventory $0<g<p$
R	Financing company pledge loan interest rate	Q	Exogenous default rate of financing companies
ω	Pledge rate (the ratio of loan amount to pledged inventory value), $0 \leq \omega \leq 1$	r	Bank loan cost interest rate
π	Bank's profit at the end of the pledge business	a	Inventory depletion rate during pledge period, including natural depletion rate, supervision and storage negligence loss $0<\alpha$
a_0	Initial attrition rate, that is, the attrition rate when the bank does not use the IoT platform	i	Pledge inventory loss improvement factor, $i>0$
θ	Coverage factor for banks using IoT technology $0<\theta<1$	T	The pledge cycle of pledge business
t	A certain moment during the pledge business, $0 \leq t \leq T$	$Z(t)$	Pledge inventory inventory at time t
c_0	Regulatory costs when not using IOT technology	$C(\theta)$	Bank supervision costs
l	Maximum loan loss that the bank can afford, $0<l<1$	η	Maximum risk tolerance that the bank is willing to accept, $0<\eta<0$

4.1 Scenarios Not Using IOT technology

4.1.1 Objective Function

When the bank does not use the Internet of Things technology, the inventory enters the pledge warehouse of the third-party logistics company, and the bank sets a fixed supervision fee for the third-party logistics company. Considering the loss of inventory, the remaining inventory and time meet the conditions[12-13].

$$\begin{cases} \dfrac{dZ(t)}{dt} = -\alpha_0 Z(t) \\ Z(0) = q_0 \end{cases} \tag{1}$$

From formula (1), the formula for the remaining amount of pledged inventory is

$$Z(t) = q_0 e^{-\alpha_0 t} \tag{2}$$

The loan of the financing enterprise at the beginning of the pledge business period is $\omega q_0 p$, During the pledge period, the price of the pledged property is stable, and at the end of the pledge period, the Repayment of principal and interest is as follows $\omega q_0 p(1+RT)$,Considering that when the pledge rate is set from the perspective of the bank, the value obtained by the financing enterprise from normal sales of the pledge should not be lower than the sum of the loan principal and interest, therefore, the remaining value of the pledge at the end of the pledge period is $pu+g(Z(t)-u)$, There will be three situations at the end of the pledge period:

① $pu+g(Z(t)-u) \geq \omega q_0 p(1+RT)$, The financing company returns the principal and interest of the loan, and the bank informs the 3PL company to release all pledges to the financing company;

② $pu+g(Z(t)-u)<\omega q_0 p(1+RT)$, The financing company does not default with the probability of, and the financing company returns the principal and interest of the loan;

③ $pu+g(Z(t)-u)<\omega q_0 p(1+RT)$, The financing company defaults with probability Q, the pledge business ends, and it enters the liquidation process.

From this, it can be concluded that the critical demand u_1 for the endogenous default of the pledge business, when $u \geq u_1$, the financing company does not default, when $u<u_1$, the financing company may default, u_1 can be expressed as follows:

$$pu+g(Z(t)-u)=\omega q_0 p(1+RT) \rightarrow u_1 = \frac{\omega q_0 p(1+RT) - gZ(t)}{p-g} \tag{3}$$

The expected return function of the bank is

$$\begin{aligned} \pi_1 &= \int_0^{u_1} \left(Q\{[pu+g(Z(t)-u)] - \omega p q_0(1+rT)\} + (1-Q)\omega p q_0 (RT-rT) \right) f(u)du \\ &+ \int_{u_1}^{+\infty} \omega p q_0 (RT-rT) f(u)du - c_0 \\ &= Q(p-g)\int_0^{u_1} uf(u)du + QF(u_1)gZ(t) - Q\omega p q_0(1+rT)F(u_1) + \\ &(1-QF(u_1))\omega p q_0(RT-rT) - c_0 \end{aligned} \tag{4}$$

4.1.2 Model Building

In terms of constraints, in order for the pledge business to proceed smoothly, the total value of the pledged goods normally sold by the financing enterprise in the pledge business must be no less than the sum of the principal and interest of the pledged loan, so it can be known:

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$$pZ(t) \geq \omega pq_0(1+RT) \quad (5)$$

The bank will adopt the downside risk control strategy, so it can be expressed as:

$$P(\omega pq_0(1+RT)-(pu+g(Z(t)-u)) \geq l\omega pq_0) \leq \eta \quad (6)$$

The model can be obtained by combining the above formulas as follows:

$$\max \pi_1 = Q(p-g)\int_0^{u_1} uf(u)du + QF(u_1)gZ(t) - Q\omega pq_0(1+rT)\ F(u_1) + (1-QF(u_1))\omega pq_0(RT-rT) - c_0$$

$$\text{s.t.} \begin{cases} pZ(t) \geq \omega pq_0(1+RT) \\ P(\omega pq_0(1+RT)-(pu+g(Z(t)-u)) \geq l\omega pq_0) \leq \eta \\ 0 \leq \omega \leq 1 \end{cases} \quad (7)$$

4.2 Scenarios Using IOT Technology

4.2.1 Objective Function

In traditional inventory pledge financing, inventory supervision is dominated by manual supervision led by third-party logistics companies, and banks pay fixed supervision fees to third-party logistics companies, but this kind of supervision often results in low-level efforts of third-party logistics companies. Causes high loss. Therefore, in this module, the bank adopts the Internet of Things technology to see the inventory supervision status at the terminal, thereby increasing the effort of third-party logistics companies and reducing the loss rate of pledges.

First, set the loss improvement function under the Internet of Things technology adopted by the bank. When the bank adopts Internet of Things technology supervision, the pledge inventory loss rate changes from the initial A to D. This function is two-order continuous and differentiable, and has the following properties:

① $\alpha'(\theta) \leq 0$, Indicates that the loss rate decreases as the coverage of the Internet of Things increases;

② $\alpha''(\theta) \geq 0$, The marginal cost of IoT coverage to reduce the loss rate is increasing;

③ $\alpha(0) = \alpha_0$, Banks do not use Internet of Things technology, and the pledge inventory loss rate is still α_0.

Therefore, the loss improvement function under the Internet of Things technology can be set, where i is the loss rate improvement factor, $i>0$.

$$\alpha(\theta) = \alpha_0 e^{-i\theta} \quad (8)$$

Correspondingly, while increasing the technology coverage of the Internet of Things, banks must also invest in corresponding sensing devices, tag devices and other costs in addition to the fixed third-party logistics enterprise supervision fees. Therefore, the supervision cost of a bank consists of two parts, the labor supervision cost of third-party companies that do not use the Internet of Things technology and the input cost of supervision using the Internet of Things technology, where c_0 represents the supervision cost of not using the Internet of Things technology, b is the adjustment factor including the initial pledge inventory quantity, $C'(\theta) < 0$, $C''(\theta) > 0$, The specific form is as follows:

$$C(\theta) = c_0 + b\ln(1-\theta) \quad (9)$$

$C(0) = c_0$ Indicates that when the coverage is 0, the bank pays the labor supervision cost of the third-party logistics company, $C(1) = +\infty$ It means that the Internet of Things technology is completely covered, and the cost that banks need to pay is infinite.

In summary, the expected return objective function of banks using IoT technology is as follows:

$$\pi_2 = Q(p-g)\int_0^{\frac{\omega q_0 p(1+RT)-gZ(t)}{p-g}} uf(u)du + QF(u_1)gZ(t) - Q\omega pq_0(1+rT)\ F(u_1) + (1-QF(u_1))\omega pq_0(RT-rT) - C(\theta) \quad (10)$$

4.2.2 Model Building

The constraint conditions are the same as scenario 1, and The bank adopts the pledge rate decision model under the Internet of Things technology as:

$$\max \pi_1 = Q(p-g)\int_0^{\frac{\omega q_0 p(1+RT)-gZ(t)}{p-g}} uf(u)du + QF(u_1)gZ(t) - Q\omega pq_0(1+rT)\ F(u_1) + (1-QF(u_1))\omega pq_0(RT-rT) - C(\theta)$$

$$\text{s.t.} \begin{cases} pZ(t) \geq \omega pq_0(1+RT) \\ \alpha = \alpha_0 e^{-i\theta} \\ Z(t) = q_0 e^{-\alpha t} \\ C(\theta) = c_0 + b\ln(1-\theta) \\ P(\omega pq_0(1+RT)-(pu+g(Z(t)-u)) \geq l\omega pq_0) \leq \eta \end{cases} \quad (11)$$

5. Case Study and Results

This section uses numerical simulations and example simulations to discuss the inventory pledge rate decision of banks without and without IoT technology, as well as the comparison and analysis of factors such as attrition rate, bank's best profit, and IoT coverage rate. , In order to provide suggestions and guidance to entities who want to use the Internet of Things technology to improve the level of supervision in practice.

Suppose a company delivers a batch of soybeans to

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a 3PL company designated by a financial institution for supervision and applies for an inventory pledge loan from the bank. The quantity of soybeans is q0=10000 (hundred catties), and the unit selling price is p=120 (yuan/hundred catties).For salvage value g=50 (yuan/hundred catties), the pledge period is 3 months.The contract stipulates that the bank adopts the entrusted supervision inventory pledge model.During the pledge process, the exogenous default rate of financing enterprises is Q=0.6, the expected capital return rate set by financial institutions is R=1.25%/month,and the capital cost r=0.75%/month. The market demand u of the pledge at the end of the pledge period obeys a normal distribution with a mean value of 9000 and a variance of 2000. Loss improvement factor i=20000, risk index l=0.1, η=0.01. α=0.02/month, the supervision cost of the Internet of Things C(θ)=1000+2000ln(1-θ). Through the calculation of the model, determine the pledge rate decision of the bank to maximize profits without using the Internet of Things technology and adopt the Internet of Things technology Under the best quality pledge rate decision, the impact of the Internet of Things technology coverage rate and pledge loss rate on the bank's ending income is analyzed.

First, analyze the constraints in the model, and use matlab2018b to calculate the constraints and get the pledge rate range as 0≤ω≤0.701,In the mathematica software,Substitute the pledge rate range into the objective function under the supervision of the bank not using IOT technology,The trend of available profits is shown in Figure 2

Table 2. transformation of profits when banks do not adopt IOT technology

ω	0.557	0.603	0.648	0.673	0.701
π_1	9070.5	9761.5	10257.4	10363.7	10197.6

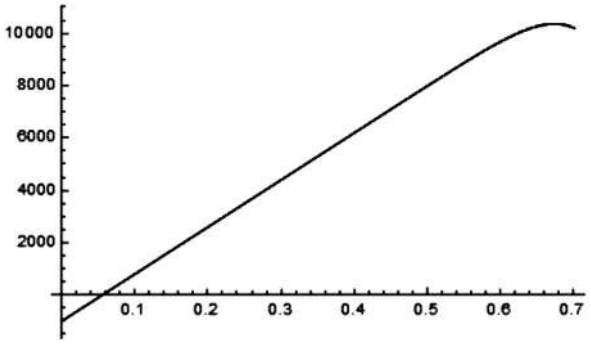

Figure 2. The trend of profit changes under the banks not using IoT technology

In the case of financial institutions that do not adopt the Internet of Things technology supervision, the partial simulation results of bank profits with the pledge rate are shown in Table 2. It can be obtained that the highest quality pledge rate is 0.673 without the supervision of the Internet of Things technology, and the bank pledge business is the largest The profit at the end of the period was 10363.7 yuan. In the bank's pledge rate decision, if the pledge rate is $0 \le \omega \le 0.061$,Then the bank pledge business is in a state of loss, and the ending profit is less than 0. Pledge rate is $0.061 \le \omega \le 0.673$, the bank's ending profit continues to increase as the pledge rate increases, reaching a maximum at 0.673.

(0.673≤ω≤1, The bank's ending profit decreases as the pledge rate increases.)

Table 3. The trend of profit and IoT coverage rate when banks adopt IoT technology

θ	0.082	0.309	0.619	0.812	0.935}
π_2	11958.9	11523.4	10363.7	9148.0	7128.9

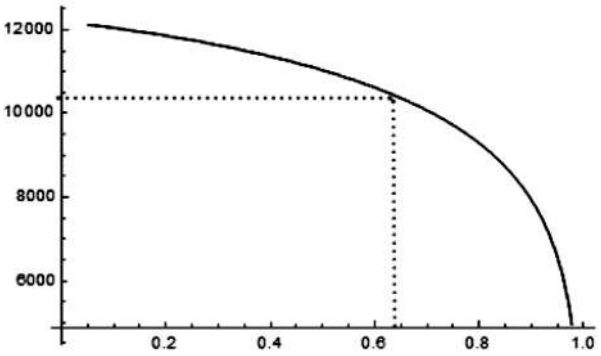

Figure 3. The profit trend of banks under the supervision of the IOT technology

The profit trend of the bank after adopting the Internet of Things technology is shown in Figure 3. According to the simulation results in Table 3, after the bank adopts the IOT technology, as the coverage rate of the IOT increases, the bank's end-of-term profit decreases. Moreover, the rate of decline in bank profits at the end of the period has accelerated, which shows that as the coverage rate of the Internet of Things technology increases after the adoption of the IOT, the marginal cost that the bank needs to pay increases. The higher the coverage rate, the smaller the income from the same level of input; The construction of networking technology requires investment in infrastructure costs. If the coverage is too low, banks are undesirable and can therefore be ignored. The cost of realizing full coverage is infinite, so the coverage rate cannot reach 1. The final comparison of the numerical simulation results of the two models shows that when the Internet of Things technology coverage rate is within the range of (0, 0.619)

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The profit obtained by using IoT technology to supervise pledges is higher than the profit obtained by not using IoT technology. At this time, IoT technology can be adopted. If the coverage rate exceeds 0.619, the bank's income from using IoT technology supervision is lower than if it is not adopted. Therefore, it is not suitable for the adoption of IOT technology.

6. Conclusion

Based on the consideration of the loss of pledges, this paper studies the pledge rate decision-making under the supervision of the bank's use and non-use of Internet of Things technology to supervise the pledges of the inventory pledge business, establishes the decision model in two cases, and analyzes the calculation examples . Research shows that when banks do not use Internet of Things technology to monitor pledges, there is an optimal pledge rate and optimal end-of-period return. After adopting Internet of Things technology, banks can only reduce pledges through supervision if the coverage rate is within a certain range. Attrition rate, so that the profit at the end of the period exceeds the profit at the end of the period without the use of IoT technology supervision. The research in this paper provides guidance for the decision-making of the pledge rate of the bank's inventory pledge business and provides a basis for whether to adopt the Internet of Things technology to strengthen supervision under the new situation.

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Problems and Countermeasures of Bike-Sharing System in China Based on the theory of Public Goods

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ABSTRACT

Under the new normal of China's economic development, bike-sharing, a new product of the "Internet +" era, opens the door to a novel lifestyle for the society, and is in the stage of rapid development. Nevertheless, with the explosive growth of the number of bicycles, some new problems gradually come out, such as disorderly parking, serious damage and waste of resources, which in turn restrict its further development. Based on the theory of public goods, this article studies the quasi-public goods attributes and problems of bike-sharing, as well as provides feasible measures for its long-term development, so as to realize the co-governance and sharing among enterprises, consumers and government.

1. Introduction

With the urbanization and expansion of cities, transportation system has become an important part of the city. However, the development of roads dominated by private cars has brought a series of problems, such as traffic congestion, heat island effect, and environmental pollution and so on. The concept of "Low-Carbon" and "Green Transportation" has become increasingly prominent.

From the perspective of space occupation and carbon emission, "Green Transportation" mainly includes walking, bikes, buses and rail transit. Among them, buses and rail transit have long played significant roles in urban public transport system. Bicycles, however, were privately owned and used over a long period of time. The earliest bike-sharing system appeared in 1965 in the Netherlands, while the domestic public bicycle system appeared before and after the 2008 Olympic Games in some big cities, such as Beijing, Hangzhou, Wuhan, etc. After 2014, with the rapid spread of Internet technology, dockless shared bikes led by Mobike and ofo began to replace the public bike system dominated by the government, and became a preferred method to solve the "last kilometer" of urban travel. But at the same time, bike-sharing has increasingly brought about prominent problems. The future development of bike-sharing thus lies mainly in the solution of those problems, including parking, recovery and maintenance, related legal issues, etc.

2. The Theory of Public Goods

2.1 Definition and Mathematical Expression

The development of the theory of public goods can be traced back to the classical school, represented by David Hume's analysis of "grassland drainage" and Adam Smith's theory on the three functions of the government.

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In the 1950s, Paul A. Samuelson completed a classical definition of public goods, until then, the theory of modern public goods was formally established. Starting from the definition of public goods, he and his later economists, such as Richard Abel Musgrave, carried out a series of studies on the optimal supply of public goods and its operating mechanism, which drove the theory of public goods to grow in a more detailed way.

According to Samuelson, public goods, which he called "collective consumption goods" in his landmark paper "The Pure Theory of Public Expenditure" in 1954, are non-rival and non-excludable, that is, one individual's consumption of such good does not lead to the reduction of availability to others, and anyone cannot be excluded from use or could benefit from without paying for it. There are three characteristics of public goods which are significantly different from private products or services: Indivisibility of utility; Non - competition of consumption; Non - excludability of benefits. On the contrary, private products are rival, excludable, rejectable, traded in the free market with opportunity cost. The products between the two are called quasi-public goods.

The difference between public goods and private goods is expressed in mathematical form as follows:

(1) Public goods: $G = Gi$

The formula shows that for any consumer i, the quantity of public goods Xi consumed is equal to the quantity X of public goods, indicating that public goods are indivisible and that all people consume the same amount of public goods.

(2) Private products: $G = \sum Gi$

The total amount of a private product X is the sum of the number Xi owned or consumed by N consumers. That is to say, a private product owned or consumed by a certain consumer is only a part of the total amount of private products, which means that private products are distributable among people.

2.2 Characteristics

2.2.1 Non-Excludability of Benefits

Non - excludability means that it is technically impossible or meaningless to prevent others from consuming because of high cost, that is, people can benefit from without paying for it. Because of this, anyone who consumes public goods does not exclude other people's consumption, there will inevitably bring about a "Free-Riding" phenomenon where public goods benefit free-riders, those who have not paid for it.

2.2.2 The Indivisibility of Utility

Private goods can be divided into many units that can be bought and consumed by different people, whereas public goods are available collectively, shared by all members of the society and are inseparable. The indivisibility of utility is actually the extension of the non - excludability of benefits.

2.2.3 Non - Competition of Consumption

Marginal production cost is zero: in the existing level of public goods supply, new consumers entering do not result in the increase of supply costs. (e.g., the lighthouse)

Marginal congestion cost is zero: anyone's consumption of public goods will not affect the quantity and quality of other people enjoying the same public product at the same time, which means that individuals cannot adjust the quantity and quality of their consumption.

Whether the marginal congestion cost is zero is an important standard to divide the types of public goods.

2.3 Classification

Public goods are generally divided into pure public goods and quasi-public goods (i.e. mixed goods).

Pure public goods are consumed by the whole society. Strictly speaking, they are non-rival and non-excludable. In addition, they are also indivisible. Their consumption is shared by many consumers on the premise of maintaining their integrity.

Quasi-public goods are located between public goods and private goods, which do not have the property of pure public goods or private products, but to some extent, they have the nature of these two products more or less at the same time. On the whole, quasi-public goods cannot be non-rival and non-excludable in the meantime, otherwise they will become pure public goods. Similarly, quasi-public goods cannot be rival and excludable at the same time, or they will become private products.

3. Shared Bikes

3.1 Definition

Robin Chase, co-founder and former CEO of Zipcar——the first car-sharing company in the world, expounded main points of "sharing economy" in her bookPeers Inc: How People and Platforms are Inventing the Collaborative Economy and Reinventing Capitalism: Using idle resources to achieve utility; Internet platform promoted by science and technology; Influential people are the main participants. In summary, the sharing economy has the following characteristics:

1)Tripartite model: the supply-side, the demand-side and the platform-side are independent of each other

2)The supplier and the demander meet the interactive

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demand through the platform

3)The platform-side does not own resources, and only promotes transactions

4)The utility of unilateral access to platform depends on the size of the other side

According to the above conditions, traditional companies like Airbnb, Uber and DiDi all have typical business models of sharing economy. However, the existing bicycle rental enterprises based on Mobile Internet technology, in the name of "sharing", just use the convenience of scientific advancement to innovate the traditional bicycle operation mode, which actually does not belong to "sharing economy". The so-called "shared bikes "are exactly "Internet rental bikes".

From the perspective of public goods, the shared-bike is a kind of quasi-public good, quite different from public rental bicycles funded by government with the mission of public welfare operation. First of all, the shared-bike is completely controlled by market forces, whereas the supplier of public rental bicycles is the government. Secondly, the user experience of shared-bikes is better than that of public rental bicycles, mainly due to the convenience of dock-free and self-service. Compared with traditional bicycles that need to be stationed in the dock, operation places of sharing-bike are far more than traditional and public rental bicycle system. But uncontrolled parking of shared-bikes has also occupied some public space.

3.2 Characteristics

As a quasi-public product, bike-sharing has the following characteristics.

3.2.1 Non-competition

From the perspective of Aggregate Supply-Aggregate Demand Model, the actual operation volume of bike-sharing is very large, already reaching the saturation of market demand. Additionally, there is no congestion cost for shared bikes. Under the current sufficient input, one more new consumer using will not affect the quantity and quality of shared bicycles enjoyed by other consumers, thus in theory, there will not induce additional production cost.

3.2.2 Excludability

At the technical level, bike-sharing excludes people who are not willing to pay for their use. Charging on time also ensures that a certain shared-bike brings benefits to specific users who pay for their use and are in the use period.

In the way of use, the excludability is reflected in indispensable elements of employing, such as the mobile phone, network, app, network payment and suitable target bikes.

In law, bike-sharing, as a non-motor vehicle, is also excludable. According to Article 72 of < Regulation on the Implementation of the Road Traffic Safety Law of the People's Republic of China>, cycling must be at least 12 years old.

3.2.3 Profitability

Different from the public bicycles funded by the government, shared bikes are provided by enterprises for the purpose of making profits. The excludability is the guarantee of the profitability. Its profit model is considered to guarantee the bottom with rent and provide profit potential with deposit. However, in the late period of capital harvest, its profitability and capital sustainability are widely questioned. Moreover, advertising placement is also a means of profit.

3.2.4 Externality

Externality refers to the positive or negative external influence on the welfare of others.

The positive externalities of shared bikes are mainly reflected in two aspects—traffic and environment. Bike-sharing, as a means of transportation to solve the "last mile", makes the public transportation system more perfect and systematic. Furthermore, as a substitute for motor vehicles, it is conducive to reduce exhaust emissions and improve the environment. The negative externalities of bike sharing are manifested in the non-standard parking and public space occupation caused by the overflow of bikes, which affect the normal function of public facilities and induced legal problems as well as potential security risks in road operation.

3.3 Problems

Although bike-sharing has solved problems of market failure and government failure in short distance travel, it has also given rise to new problems in management, such as excessive production, lack of parking planning in management links, etc. This paper analyzes existing issues of shared bikes from the angle of quasi-public goods.

3.3.1 Insufficiency of Non-competition

The lack of non-competition is reflected in unbalanced regional supply and untimely bike-scheduling. In the initial stage, in order to increase market share, bike-sharing companies choosed to put bicycles in areas with large traffic volume. Under such a strategic deployment, the per capita share of shared-bike in the regions with large flow of people far exceeds those in the remote and sparsely populated areas, resulting in the imbalance of regional supply.

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In addition, since the main purpose of bicycle travel in the city is commuting, the number and location of bikes are almost the same as the tidal changes of traffic, so it is necessary to carry out dispatching management. However, in reality, companies often only focus on the number of bicycles, losing sight of scheduling.

3.3.2 Insufficiency of Excludability

This is the main reason for many bike-sharing management problems.

The phenomenon of free-riding is manifested by many people riding the same bike, breaking the car lock or even adding a lock on shared-bike for private use, etc. This phenomenon not only brings huge losses to bike-sharing companies, but also damages consumer welfare, and even causes a waste of social resources.

3.3.3 The Unsustainability of Profitability

The market of bike-sharing is a game of capital, where the key point of capital investment is the huge deposit instead of the rent. In fact, due to the single source of income and poor anti-risk capability, the profitability of bike-sharing is very weak. Especially because of the extremely high damage rate, low utilization and recovery rate, the cost of production and maintenance is a huge burden. Most bike-sharing companies are insolvent and have serious book deficits. Even with capital support, the business situation will not be optimistic in the short term.

3.3.4 The Social Cost Caused by Externality Is Huge

Bike-sharing is a kind of special behavior that consumes both private goods (bicycle itself) and public resources (road space). The particularity of using public resources will inevitably produces a negative externalities after the market scale reaches a certain limit, which will bring cost to the society. At present, bike-sharing has greatly reduced the short-term cost of travel, and has been enlarged into a "market" with the participation of capital. Nevertheless, due to the crowding effect, just in terms of the space and way of parking, bike-sharing has caused various inconveniences to the environment, society and economy, for example, the congestion cost caused by the confusion in parking, deposit and information security cost.

4. Countermeasures

4.1 Enterprises: Strengthen the Sense of Responsibility

Bike-sharing companies have made some contributions in the supply of public transport, but they also produces some problems in the process of production and management, which have brought about negative social effects. In order to get rapid development and customer recognition, these companies must shoulder social responsibility. In reality, the supply of shared-bikes exceeds the demand that consumers can consume and the degree that the society can accept. This excessive supply to occupy the market is overcapacity and waste of resources. Therefore, the industry should adjust production, digest excess capacity, improve the recovery rate of waste bikes, and reduce resource loss. Moreover, it is also necessary to create a diversified profit model to resist multi-risks. In terms of information security, consumers' privacy should be protected to avoid the leakage of personal information. As for bicycle management, the regional input olume ought to be reasonably planed with a peak control, maintenance and recycling of bikes should be timely carried out to improve the utilization rate as well as reduce the occupation of public space.

4.2 Citizens: Cultivate Social Consciousness

Consumer behavior affects the development of bike-sharing. Improving moral literacy and civic awareness will help to reduce the operating cost and solve many problems in the use of bike-sharing. The "dockless" characteristic of should not be shown as disorderly parking, and consumers should not affect public order for their own convenience. The unqualified children-riding problem is more the responsibility of guardians and schools. Abiding by traffic rules is the basic guarantee of travel safety. If consumers can correct their bad behavior, problems such as high damage rate, low utilization rate and public space occupation, etc., will be gradually solved, which in turn gives companies the possibility of making profits and the incentive to provide better service experience in the long run, forming a virtuous circle.

4.3 Government: Give Full Play to Government Functions

First, the government should act as a regulator. It is undeniable that "bike-sharing" is a new trend that is worth encouraging in the social and economic development under the background of the current Internet technology revolution. However, as a part of the market economy, we cannot ignore the possibility of various market failures. Even at the level of the industry itself, is there unfair competition and monopoly? Is it harmful to the interests of consumers? Is there any economic and financial risk? And whether it will overdevelop and cause some external

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effects? All these call on the government to give regular market supervision. Of course, market regulation is not to restrict the development of "bike-sharing", on the contrary, it is just to promote a better and healthier development. For the moment, there seems to be a lack of regulatory measures for shared-bikes, not good for its long-term development.

Second, the government should act as the supplier of public goods. As far as all kinds of shared transportation modes are concerned, they still belong to the category of urban transportation in essence. Based on the utilization of urban public land resources, whether it is buses, taxis, or shared-bikes, they must have more or less some attributes of public goods. Focusing on the healthy and orderly development of the city, what the government should ensure is to provide necessary public transport infrastructure and public goods. Of course, the government can not only provide public goods through its own direct supply, but also through the way of third-party purchase. Yet, no matter what mode of supply, the government cannot ignore its responsibility in creating and providing transportation services. In this regard, the government should consider how to effectively participate shared-bikes production in terms of public goods supply. Only when they are included in the public goods for urban transportation, can it truly demonstrate the responsibility of the government as a public goods's supplier, which is also the largest support and encouragement for bike-sharing industry.

Third, the government should also play the role of "Administrator". In the supply of urban public transportation, apart from the economic relationship between supply and demand, there are also social relationships in the sense of governance, which are reflected in how to integrate social factors such as communities and individuals into the construction process of urban transport, and how to eliminate all kinds of negative externalities to the greatest extent through the "co-governance" relationship among the three parties—the government, market and society, instead of relying solely on administrative or market forces. For example, in the case of disorderly parking of shared bikes, there are not only the reasons for parking space planning, but also factors of bicycle scale and pricing. Besides, it cannot be denied that the lack of traffic civilization is also a cause. As a result, so as to solve this problem, in addition to efforts of the government and companies, how to cultivate and promote a civilized travel habit in the whole society is the key to solve this problem in the long run. During this process, relevant departments of the government should be good at "govern" related problems at the root through top-level design, rather than merely "solving" temporarily at the technical and economic levels.

5. Conclusion

In general, the development of bike-sharing has become a real market today. Since it is a market, the government should treat it according to the objective law of the market. Only in this way can the government's role as a market watchman and judge rather, than a protagonist, be truly highlighted.

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Learning Effect and Productivity Convergence of Chinese Industrial Enterprises

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ABSTRACT

The main purpose of this paper is to test the production efficiency of different Chinese property industrial enterprises. Based on the large sample panel data of industrial enterprises of the National Bureau of Statistics, we found that although the production efficiency of China-funded enterprises is generally weaker than foreign-funded enterprises, some China-funded enterprises have better learning ability. On the one hand, dynamic analysis found that private enterprises have significant learning ability. On the other hand, the results of convergence analysis show that China's private enterprises have the potential to gradually catch up with the frontier level of world production efficiency and have better learning ability to catch up potential. And state-owned enterprises tend to be more efficient at the beginning of their establishment, but their productivity is fairly slow to improve, especially for state-owned enterprises with high efficiency sub-samples, so that it's hard for them to continue improving their efficiency. Institutional analysis found that the marketization process helped the China enterprises to improve their learning ability and China should continue to strengthen the reform of property rights and promote the marketization process.

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1. Introduction

Throughout the reform and opening up over the last thirty years, China has achieved rapid economic growth and created a "Chinese miracle" (Lin and Li,2004; Syverson ,2010; Sun et al.,2013)[1-3]. In terms of the GDP, China is already the second largest economic power in the world, but this does not literally mean that China is a well-developed country. Under the market economy system, the fundamental of national competitiveness lies in enterprise production efficiency. After the reform, China has established a modern enterprise system and implemented shareholding, but can China's China enterprises gradually approach or even catch up with the frontiers of multinational enterprises' production efficiency? This issue needs an empirical analysis to answer.

Productivity is a key topic in the study of microeconomics. There are many empirical studies on the efficiency of Chinese enterprises. In the longitudinal development of time , Early literatures such as (Jefferson et al.,1992; Jingwen et al.,1992; Xiaolu,2000)[4-6]measured the production efficiency of Chinese enterprises from different angles ,and found that the level of production efficiency of Chinese enterprises has been significantly improved since the reform and opening up. In the aspect of the horizontal country, some works found that there is still a big gap between the production efficiency of Chinese enterprises and foreign companies (Y. F. Huang and Ren, 2002; Zhu and Li ,2005)[7-8]. But the above-mentioned literatures mainly analyze cross-section data, have not carried out dynamic research on panel data, nor discussed the change in the efficiency gap between the China production efficiency frontiers represented by China and multinational enterprises in the course of time development.

So investigating the data of listed companies, some works found that there is a big gap between Chinese enterprises and companies in Japan or Korea, showing a significant catch-up trend (Yuan ,2009 ;Jin ,2012)[9-10]. Based on China's industry data, and compared the efficiency trends of China and foreign-funded enterprises, the productivity of China-funded enterprises has increased year by year, while the productivity growth rate of foreign-funded enterprises has slowed down, and the gap between the two has been shrinking (Yan ,2008)[11]. However, the number of listed companies in China is limited, so the sample of listed companies is difficult to represent Chinese enterprises. And as the sum of individual data of the enterprise, the industry data cannot distinguish the heterogeneity of the enterprise. Analyzed the productivity overtaking performance of different ownership enterprises based on labor productivity indicators, the labor productivity of Chinese enterprises has surpassed the trend (Yu et al. ,2013)[12]. However, the single factor productivity of labor productivity cannot fully measure the true efficiency level of enterprises. Moreover, (Yu et al. ,2013)[12] theirs research focuses on industry-level analysis, and the analysis of the efficiency of different ownership firms is still general. These studies either stay at the industry level or perform annual data analysis of cross-sections, therefore we need to use the big data from hundreds of thousands of companies collected by the National Bureau of Statistics for research. We need to study whether the efficiency of China's state-owned holding enterprises has improved and the efficiency of private enterprises. Moreover, the existing literature on efficiency catching up has rarely discussed the learning ability of state-owned and private enterprises. And it is necessary to analyze whether the enterprises with different property rights in China have significant learning ability.

In the efficiency catch-up process, variety in the nature of ownership may lead to changes in different production efficiencies. There are many documents on the comparison of production efficiency between state-owned enterprises and private enterprises in China-funded enterprises. In the 1990s, private enterprises could constrain agency costs and improve production efficiency (W. Y. Zhang et al. ,1995; X. X. Liu ,1995 ; Xie et al. ,1995)[13-15]. And state-owned enterprises have a policy burden which lead to an inefficiency in production (Lin and Zhou ,1997)[16]. However, in recent years, modern enterprise systems have been established and corporate governance has begun to regulate. Analysis of the data obtained by the World Bank in 2003 on 1,483 companies in 18 cities in China, some works found that state-owned enterprises have more innovative inputs and outputs than private enterprises (Li and Song ,2010)[17]. Analysis of the industry data collected by the National Bureau of Statistics of China from 2003 to 2010, some works found that the efficiency growth rate of state-owned enterprises in 21 industries is better than that of private industrial enterprises (Hao et al. ,2012)[18] and the article believes that state-owned industrial enterprises have better development vitality and potential.

The new institutional background prompted us to re-examine the efficiency of state-owned enterprises and private enterprises, and we need large sample enterprise data after the 1990s to re-examine the efficiency of state-owned private enterprises. More importantly, can the productivity of private enterprises catch up with foreign multinationals? We need to thoroughly compare the production efficiency of different types of property rights enterprises, and estimate the catch-up trend of state-owned and private enterprises. In addition, it is necessary to ana-

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lyze and explore the learning ability of different types of enterprises.

This paper uses the industrial enterprise database of the National Bureau of Statistics of China to analyze the annual observation points of 2.07 million enterprises. Based on the data, this paper compares the production efficiency of different property rights enterprises, analyzes the efficiency learning ability of China and foreign enterprises under different efficiency levels, studies the property rights efficiency problems among regions with different degree of marketization, uses the convergence analysis method to predict the efficiency of Chinese enterprises to catch up with the potential and while paying attention to the efficiency differences and learning ability of newly established enterprises, has obtained a more comprehensive dynamic trend of China's enterprise efficiency. As a result, this article has certain contribution to the existing literature of property rights and the literature of surpassing. First of all, through the panel data regression of large samples, this paper puts forward the priority of production efficiency of different property rights enterprises, which are foreign capital, private and state-owned, this is the consolidation and corroboration of the existing literature. Secondly, this paper finds that private enterprises have significant learning ability, while state-owned enterprises are barely satisfactory, which is an in-depth study of existing literature from a dynamic perspective. Thirdly, this paper firstly applies the convergence analysis theory of economic growth to the comparison of ownership efficiency. Through the regression analysis of the conditional convergence equation to investigate the efficiency convergence rate and steady-state efficiency level of state-owned holding enterprises and private enterprises, it is found that China's private enterprises have certain catch up with potential. Finally, this paper analyzes the efficiency level and learning ability of newly established enterprises, partially answers the doubts about the efficiency improvement of state-owned enterprises in recent years, and deepens the existing research on the efficiency catching up.

2. The Basic Facts Description of Different Ownership Companies

The sample data we use is derived from the China National Bureau of Statistics' China Industrial Enterprise Survey Database, which includes statistical data on the annual data of all state-owned and non-state-owned industrial enterprises with sales of more than 5 million yuan. Since the data after 2008 involves the lack of statistical variables, in order to be rigorous, and the data of the large sample panel for ten years is enough to analyze our problems, the data in this paper is selected as of 2007. By the end of 2007, the database had collected more than 300,000 enterprises in China, and its output value accounted for 95% of China's total industrial output value, which can be used as an effective sample for Chinese enterprises. During the period 1998-2007, our sample contained a total of 2,226,264 observations. Drawing on (Cai and Liu ,2009)[19], we removed the missing key indicators, the number of employees less than 8 and the observation that obviously did not conform to the accounting principles, deleted the extreme observation values of key variables, and finally obtained 2,074,240 observation samples. Such a large sample can overcome the problem of additive deviation and sample selectivity deviation.

With regard to the classification of enterprise ownership, the existing literature is usually defined according to the type of enterprise registration. However, by comparing the two types of property rights, we find that the number of enterprises registered as foreign capital is higher than the number of enterprises registered as foreign capital. Between 1999 and 2007, 6% of the enterprises registered as foreign capital in China's industrial enterprise database had a capital value of 0 (Nie et al. ,2012)[20]. According to the article, this error stems from registration errors, lack of timely changes in registration types, and deliberate fraud in order to enjoy tax benefits. In contrast, the type of holdings defined by paid-in capital can reflect the type of ownership of the firm more realistically and in a timely manner. Drawing on (Lu ,2008)[21], this paper classifies enterprises with paid-in capital of foreign capital or Hong Kong, Macao and Taiwan shares of not less than 25% as foreign-funded enterprises (Foreign), and less than 25% of China-funded enterprises (China). According to whether the registered capital of China enterprises exceeds 50 %, the type of enterprise holding is defined, that is, state-owned enterprises (state) account for more than 50 % of the total registered capital, private enterprises (private enterprises) account for more than 50 % of the total registered capital, collective enterprises (collective enterprises) account for more than 50 % of the total registered capital, and other China enterprises uniformly define other enterprises.Table 1 reports the proportion of the number of firms with different ownership types, output and employment in the sample data.

Table 1 shows that in terms of the number of enterprises, output and employment, state-owned enterprises have shown a decreasing trend year by year. The number of state-owned enterprises has shrunk from 30.3% in 1998 to 3.3% in 2007, the proportion of output has decreased from 38.2% to 12%, and employment has decreased from 50.2% to 12.2%. In contrast, the proportion of private

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enterprises has increased year by year. In 2001, the number of private enterprises accounted for 28%, becoming the highest among all kinds of enterprises; in 2004, the number of jobs exceeded state-owned enterprises for the first time; in 2005, the proportion of output exceeded that of state-owned enterprises. These figures confirm the fact that in recent years, China's private enterprises have grown and the state-owned enterprises have quit continuously, that is, "the state-owned deteriorating with the private-owned advancing." From the perspective of foreign-funded enterprises, since 1998, both the number of enterprises, output and employment have shown an upward trend. Since 2005, business Numbers and output have fallen, but employment has not.

Overall, the average share of foreign-invested enterprises is less than one-fifth (18.3%) of the total society, while the average output is as high as 30%. This is not only the result of an open policy, but also a manifestation of the competitiveness of foreign-funded enterprises. Although the number of state-owned enterprises has dropped significantly, they have assumed an average of 27.4% of employment; to a certain extent, this reflects the policy burden of state-owned enterprises. The average number of private enterprises in China accounts for 37.4%, which is the highest among all types of enterprises, but the average output is one-fifth of the whole society. This means that the scale of private enterprises is small, and their output capacity still has a certain gap compared with foreign-funded enterprises.

On average, state-owned enterprises have the highest labor input, and private enterprises have the highest capital investment, but the output levels of the two are far lower than those of foreign-funded enterprises. In this regard, we initially concluded that the production efficiency of China-funded enterprises may be lower than that of foreign-funded enterprises. The data will be analyzed by regression below.

3. Efficiency Gap between Different Property Rights Enterprises

Numerous literatures believe that total factor productivity (TFP) is the best measure of the productivity level of Chinese enterprises (Mao and Sheng, 2013; Gao et al., 2014; Sui et al., 2017)[22-24]. Based on the classical literature (Christensen et al. ,1973)[25] and the data characteristics of this paper, we use the trans-log production function to estimate total factor productivity. This paper argues that total factor productivity is influenced by property rights factors, so the ownership independent variable is included in the trans-log production function. This approach can clearly compare the level of productivity of different ownership companies (Sabirianova et al. ,2005)[26]. The specific model settings are as follows:

Table 1. Statistics on the quantity, output, and employment of enterprises with different ownership

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average
Proportion of quantity (%)											
Foreign	15.4	16.4	17.3	18.1	18.1	18.8	19.8	19.5	18.8	18.3	18.3
Private	13.4	15.3	20.8	28.0	33.7	38.7	44.2	45.5	47.8	48.7	37.4
State	30.3	28.2	23.6	18.7	15.4	11.7	7.8	6.1	4.81	3.3	12.2
Collective	27.6	25.7	22.0	17.7	14.5	10.5	8.1	5.99	5.16	4.3	11.7
Others	13.2	14.4	16.3	17.4	18.4	20.4	20.2	23.0	23.4	25.5	20.4
Output ratio (%)											
Foreign	22.0	24.1	25.9	27.8	28.5	30.0	32.9	31.5	31.9	30.5	30.1
Private	6.2	7.3	9.8	12.8	15.3	18.0	18.0	21.9	23.6	25.3	19.2
State	38.2	38.9	34.9	31.0	26.6	23.3	20.5	16.2	13.8	12.0	20.4
Collective	15.7	13.9	11.5	9.5	8.0	6.33	5.5	4.0	4.0	3.7	6.2
Others	18.0	15.8	17.9	18.9	21.6	22.4	23.1	26.5	26.7	28.5	24.1
Employment share (%)											
Foreign	12.3	14.5	16.2	18.3	19.1	21.7	25.7	26.6	27.8	28.0	21.8
Private	6.8	8.3	11.6	16.1	19.5	23.2	26.6	27.9	29.1	30.0	21.0
State	50.2	46.7	40.8	34.9	30.7	25.6	19.7	16.4	14.0	12.2	27.4
Collective	17.9	16.7	14.8	12.7	11.1	8.2	6.8	4.9	4.64	4.2	9.5
Others	12.7	13.9	16.5	18.1	19.6	21.4	21.2	24.2	24.4	25.6	20.3
Sample(ten thousand)	13.4	14.4	14.7	15.5	16.7	18.5	26.2	26.0	29.1	32.8	20.7

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$$\ln Y_{it} = \beta_0 + \sum_k \beta_k \ln x_{ikt} + \frac{1}{2}\sum_k \sum_l \gamma_{kl} + \ln x_{ikt} \ln x_{ilt} + \rho Z_{\text{it}} + \delta I_{it} + \zeta T_t + v_i + \varepsilon_{it}$$

Among them, Y_{it} represents the output of the i enterprise in the t period, x_{ikt} is the input of k elements, Z_{it} is the ownership classification, I_{it} and T_t are the virtual variables of the industry and the year in which the enterprise is located. v_i is an individual effect that can not be observed without changing time. ε_{it} is a random disturbance term. Specifically, this paper uses industrial value added to measure the output variables, and uses the factory price index of industrial products in various industries to reduce, and then get the adjusted price index Y_{it}. The China Statistical Yearbook provided 38 industrial product ex-factory price indices in 2002-2007, but only provided industrial production ex-factory indices for 14 production sectors during 1998-2001. For the sake of consistency, we have mapped 39 double-digit industry indices to 14 industrial production sectors and converted them into the factory price index for industrial products based on 1997. Due to the absence of industrial added value in the industrial database of the National Bureau of Statistics in 2001 and 2004 during the sample period, we used (X. X. Liu and Li ,2008)[27] methods to make relevant adjustments. The industrial added value used in this paper in 2001 is the total industrial output value minus the input of intermediate goods plus VAT. The industrial added value in 2004 equals the sales income plus the initial inventory minus the input of intermediate goods plus VAT. In the measurement of input factors, we use the annual average balance of fixed assets to measure the capital input factors, and use the fixed asset price index based on 1997 to reduce; we use the annual employment of employees to measure the labor input factors; We use the intermediate product input as an intermediate input factor, and use the raw material, fuel, and power purchase price indices to reduce. This method is similar to (Wang and Tu ,2008;Qi et al. ,2008) [28-29].

Equation (1) can be simplified to the following model:

$$\ln Y_{it} = \beta X_{it} + \rho Z_{\text{it}} + v_i + \varepsilon_{it} \quad (2)$$

Where *X* is the input element vector and the dummy variable of the industry and year, and *Z* is the ownership classification variable, $E(v_i) = E(\varepsilon_{it}) = E(v_i \varepsilon_{it}) = E(\varepsilon_{it} \varepsilon_{is}) = 0$ (for any $t > s$).

Z is the object of this study. In view of the space, we omitted the report on *X* in the following table. In terms of measurement methods, we believe that potential owners may adjust the type of ownership based on past production efficiency shocks. That is to say, in equation (2) the ownership variable is a "pre-determined variable", is $E(Z_{it} \varepsilon_{it}) = 0$, but $E(Z_{it} \varepsilon_{is}) \neq 0$ (for any t>s), $E(Z_{it} v_i) \neq 0$. In the case of this causal problem, the use of ordinary least squares and random effects models can lead to biased estimates. In contrast, fixed effects or first-order differences allow Z_{it} to be related to v_i, so fixed-effect regression methods are more feasible. However, it is important to note that the key variable in the model—ownership—is a relatively stable variable that has no change or limited variation over time. If fixed effect estimates are used, it will result in a larger estimate bias (Griliches and Hausman,1984)[30]. Therefore, after weighing the comparison, we think that it is more suitable to use the random effects model, so the analysis in this paper is mainly based on the regression results of random effects.

Table 2 shows the comparison results of production efficiency of different ownership enterprises. The relative value between production efficiency of different types of enterprises is obtained by regression model (1). State-owned enterprises are the benchmark group, and other types of ownership include foreign-funded enterprises and private enterprises. In order to obtain more robust results, regression results of ordinary least squares (OLS), median regression (QREG), and random effects (RE) were also reported. Among them, OLS is the least squares regression using the robust variance method to control the heteroscedasticity between individuals, abbreviated as OLS_Robust. In terms of measurement methods, Table 2 illustrates the consistency of results for multiple methods in oversized samples.

Table 2. Comparison of average production efficiency of different ownership companies

	OLS_Robust	QREG	RE
Foreign	0.997***	0.881***	0.806***
	(0.004)	(0.003)	(0.004)
Private	0.899***	0.777***	0.715***
	(0.003)	(0.003)	(0.004)
No. of obs	1,408,381	1,408,381	1,408,381
No. of firms	463,864	463,864	463,864
R^2	0.582		
Pseudo R^2		0.361	
Within R^2			0.210
Between R^2			0.574
Overall R^2			0.580

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively. State-owned enterprises (State) are the benchmark groups.

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In the use of different methods, Table 2 finds that the two property rights coefficients of Foreign and Private are significantly positive. This means that compared with state-owned enterprises, the level of production efficiency of foreign-funded enterprises and private enterprises is significantly higher than that of state-owned enterprises. Table 2 further illustrates that the coefficient of Foreign is about 10 percentage points higher than Private. This means that the level of production efficiency of foreign-funded enterprises is higher than that of private enterprises. The World Bank's data on the survey of a small number of enterprises in China, and also obtained the same results (Xu ,2004)[31]. This paper believes that the priority of China's enterprise efficiency level is foreign-funded enterprises, private enterprises and state-owned enterprises.

Equations 1 and 2 apply to the efficiency comparisons of different companies, but do not report productivity values. In order to observe the level of productivity of different types of companies, we use Levinsohn and Petrin (hereinafter referred to as LP method) to measure firm productivity in Table 3(Levinsohn and Petrin ,2003)[32]. This method puts the intermediate product into a proxy variable for productivity shock, making the calculation result more accurate than using the production function method. In China's corporate efficiency research literature, (Gong and Hu,2013)[33] and others also adopted this method.

Table 3 reports the productivity levels of the three types of firms. We found that foreign-invested enterprises are higher than China-funded enterprises, regardless of whether they are average or median, and private enterprises in China capital are higher than state-owned enterprises.

Table 3. Actual TFP values (LP method)

	Obs.	Mean	P50	Sd.	Min	Max
Foreign	380175	7.05	6.98	1.25	-3.24	15.1
Private	774980	6.72	6.66	1.05	-2.15	12.8
State	253226	5.98	6.04	1.72	-2.65	14.4

There are a large number of companies in China. Not only is the mean and median of productivity levels important, but the distribution of productivity is also needed to be studied. In fact, the distribution of productivity levels has become the focus of economic growth theory in recent years (Syverson,2010; Sun et al.,2013)[2-3]. Table 4 ranks all enterprises in the National Bureau of Statistics industrial enterprise database according to the annual efficiency level, with the 33rd and 66th percentiles as the demarcation point, According to different years, the samples were divided into three groups: low efficiency, medium efficiency and high efficiency, and then the distribution of enterprises with different ownership types in different efficiency groups was obtained. We found that about 44% of foreign-invested companies are in the high-efficiency group, and 47% of the state-owned enterprises are in the low-efficiency group, accounting for the highest proportion among the high-efficiency group and the low-efficiency group, private enterprises are between foreign-invested enterprises and state-owned enterprises in different efficiency groups, and the distribution is relatively uniform. This once again confirms the superior order of property rights of China's enterprise efficiency level, from high to low for foreign capital, private and state-owned.

Table 4. Distribution of production efficiency of enterprises (Unit: %)

	low	medium	high
Foreign	23.3	32.5	44.2
Private	33.5	36.9	29.6
State	47.9	23.6	28.5

Since the reform and opening up, China's economic system has changed dramatically, including the modern enterprise system. In the process of institutional changes, have the levels of production efficiency of enterprises with different property rights in China changed? In November 2002, the 16th National Congress of the Communist Party of China clearly put forward policies such as "deepening the reform of the state-owned assets management system and improving the quality and level of foreign capital utilization"; in 2003, the establishment of the State-owned Assets Supervision and Administration Commission also marked the deepening of the reform of China's state-owned enterprises. The modern enterprise system in China was initially established. (Fan et al.,2011) [34] found that The marketization process was slow during 1998-2002, and the marketization process accelerated in 2003-2007. Therefore, Table 5 uses 2002 as the demarcation point to divide the sample data into two time periods. We used random effects and quantile regression methods for regression, RE regression results measured the average efficiency level, and Quantile measured different quantile levels. Among them, the first column and the third column are based on state-owned enterprises (state), and the second column is based on private enterprises.

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Table 5. Comparison of property rights efficiency in different time periods

	Foreign-State	Foreign-Private	Private-State
1998-2002			
RE	0.988***	0.104***	0.884***
	(0.006)	(0.006)	(0.005)
Quantile			
10	1.552***	-0.063***	1.615***
	(0.008)	(0.006)	(0.011)
50	1.027***	0.108***	0.919***
	(0.006)	(0.003)	(0.006)
90	0.876***	0.278***	0.598***
	(0.005)	(0.004)	(0.005)
2003-2007			
RE	0.723***	0.087***	0.636***
	(0.014)	(0.008)	(0.013)
Quantile			
10	1.093***	-0.027*	1.120***
	(0.032)	(0.014)	(0.032)
50	0.615***	0.104***	0.511***
	(0.014)	(0.009)	(0.014)
90	0.537***	0.180***	0.357***
	(0.022)	(0.009)	(0.027)

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively.

In the first column of Table 5, we report on the efficiency of foreign-invested companies relative to state-owned enterprises. Both the RE and Quantile's Foreign-State regression results were significantly positive, with the largest regression coefficient in the 10-digit range. This shows that the efficiency level of foreign-funded enterprises is significantly higher than that of state-owned enterprises. This gap exists in the comparison of different quantiles, and the gap in the inefficient group is the largest.

Comparing the two periods 1998-2002 and 2003-2007, we found that the difference in the latter period is smaller than the previous period. In the RE regression, the efficiency of foreign-invested enterprises over state-owned enterprises has shrunk from 0.988 before 2002 to 0.723 after 2002. The three quantile regression also showed similar results, and the gap between the foreign countries with low efficiency levels has narrowed more significant. This means that as time goes by, the efficiency gap between state-owned enterprises and foreign-funded enterprises has a significant narrowing trend.

In the second column of Table 5, we report the efficiency of foreign-invested companies relative to private enterprises. Unlike the results of the first column, the decile return of the Foreign-Private gap is significantly negative. This means that private enterprises are better than foreign companies at low efficiency levels. However, at other efficiency levels, the gap coefficient between foreign and private enterprises is significantly positive, indicating that there is a gap between private and foreign-funded enterprises at other efficiency levels, especially at high efficiency levels. In a vertical comparison, the gap between foreign capital and private enterprises has narrowed with time, and the higher the efficiency, the faster the group gap narrows.

The third column of Table 5 compares the efficiency between private and state-owned enterprises in China-funded enterprises. We find that the private-owned and state-owned enterprises (Private-State) are significantly positive at different levels. This again shows that the efficiency of state-owned enterprises is lower than that of private enterprises in different distributions. In the time-segment comparison, the gap between private and state-owned enterprises is smaller than the previous period in the latter period; this means that the production efficiency of state-owned enterprises in China has increased.

In order to better demonstrate the distribution of relative productivity and the specific advantages of using large data samples, similar to the three subdivisions of the above efficiency levels, we divide the data into 100 sample groups based on the percentiles, and then return them one by one. The regression coefficients are made in Figures 1 and 2. The abscissa indicates the different quantile level, and the ordinate is the corresponding regression coefficient at different quantile levels. The reference group is the state-owned enterprise, and the corresponding ordinate is 0. Figures 1 and 2 show the relative efficiency trends of different types of firms at different quantile levels over two time periods. It can be seen from the two figures that foreign-invested enterprises and private enterprises are higher than the benchmark group of state-owned enterprises at different quantile levels. Among high-efficiency enterprises, foreign-funded enterprises are obviously in a leading position; however, among low-efficiency enterprises, private enterprises in China are superior to foreign-funded enterprises. In the comparison of different time periods in Figure 1 and Figure 2, we find that the gap between state-owned enterprises and foreign-funded enterprises has narrowed from 0.9-1.9 in the period of 1998-2002 to 0.5-1.4 in the period of 2003-2007. The efficiency gap with foreign-funded enterprises and private enterprises has also shrunk, and the efficiency gap has narrowed.

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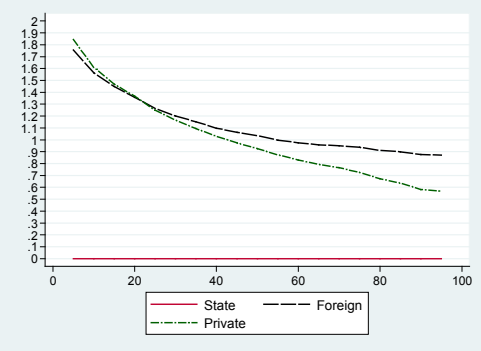

Figure 1. Comparison of relative efficiency (1998-2002)

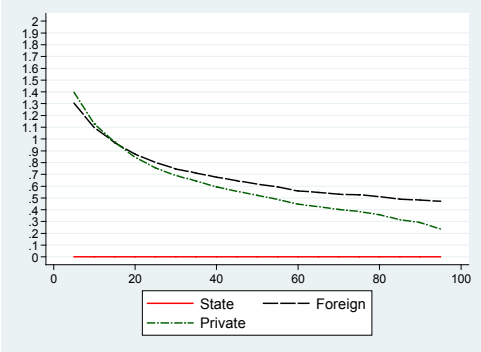

Figure 2. Comparison of relative efficiency (2003-2007)

4. The Analysis of Corporate Learning Ability

The staged regression analysis shows that there is a significant narrowing of the efficiency gap between China and foreign-funded enterprises. Relatively speaking, foreign-funded enterprises are relatively efficient, and the formation of this catch-up trend comes from the learning ability of China-funded enterprises. Due to the existence of "learning while working", enterprise productivity may increase with the growth of the company's establishment period, but some enterprises may also decline in efficiency due to obedience. In the existing variables of the industrial enterprise database, it is difficult to accurately describe the learning ability (Zhou et al., 2007)[35]. However, the efficiency of the company may be improved over time, we can define the company's ability to learn to improve production efficiency. In this section, how will the production efficiency of enterprises with different property rights change as the age of the enterprise grows? What are the learning abilities of different types of China companies?

On the basis of the model (2), we added the interaction term of the ownership categorical variable and the time trend term τ to get the equation 3.

$$\ln Y_{it} = \beta * X_{it} + \rho * Z_{\text{it}} + \varsigma * \tau * Z_{\text{it}} + v_i + \varepsilon_{it} \quad (3)$$

Where τ is the time during which the enterprise has a certain ownership duration. In order to examine the trend of enterprise efficiency in the sample period with the length of ownership duration and to compare the learning ability of different property companies, Table 6 excludes companies whose ownership changes during the sample period.

Table 6. Comparison of learning ability

	RE	QREG(10)	QREG(50)	QREG(90)
Foreign	1.068***	1.597***	0.984***	0.735***
	(0.006)	(0.008)	(0.005)	(0.009)
Private	0.916***	1.674***	0.867***	0.469***
	(0.005)	(0.008)	(0.005)	(0.008)
τ *Foreign	-0.001	0.037***	0.020***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
τ * Private	0.031***	0.044***	0.035***	0.023***
	(0.001)	(0.001)	(0.001)	(0.001)
τ *State	-0.006***	0.047***	0.025***	-0.006***
	(0.001)	(0.002)	(0.001)	(0.002)
No. of obs	1303144	1303144	1303144	1303144
No. of firms	442237	442237	442237	442237
R^2				
Pseudo R^2		0.339	0.360	0.411
Within R^2	0.212			
Between R^2	0.571			
Overall R^2	0.582			

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively. State-owned enterprises (State) are the benchmark groups.

In Table 6, the foreign-invested foreign coefficient and the private-sector Private are significantly positive under different regression methods, and the efficiency is higher than that of the state-owned enterprises as the benchmark group. In the mean RE regression, the median QREG (50) regression, and the high efficiency group QREG (90) regression, the Foreign coefficient is higher than Private. Table 6 again confirms that the priority of property rights efficiency is foreign capital, China capital and state ownership. However, in the low efficiency group QREG (10) regression, the Private coefficient is higher than Foreign. This means that private companies are more efficient than foreign companies in the distribution of low-equity efficiency 10-digits.

In Table 6, the crossover coefficient of the time trend term is used to measure the efficiency of enterprises with different ownership types over time, and can test

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the learning ability of enterprises to a certain extent. The results show that both the time trend term and the private enterprise's coefficient τ * Private are significantly positive, regardless of the average level or the quantile level. This means that private enterprises have significant learning ability and efficiency is constantly improving. Moreover, the time trend item and the coefficient of private enterprises τ * Private are higher than the time trend item and the coefficient of foreign-funded enterprises τ * Foreign, which indicates that the learning ability of private enterprises is generally higher than that of foreign-funded enterprises. It should be noted that the learning ability of private enterprises at a high efficiency level is 0.023, which is much higher than that of foreign-funded enterprises. This shows that the learning ability of private enterprises at the high-end efficiency level is particularly prominent compared with foreign-funded enterprises. This is consistent with the conclusion that the gap between the private enterprises found above and the foreign-funded enterprises at the high efficiency level is the largest. In Table 6, the coefficient of τ *State is different in the OLS_Robust regression method from the RE regression method, and there is a contradiction. This means that the learning ability of state-owned enterprises is not stable. To some extent, the quantile regression shows the reason for this instability. In the median QREG (50) regression and the low efficiency group QREG (10) regression, the time trend term is significantly positive with the state firm's coefficient τ * State; but in the high efficiency group QREG (90) regression, τ * State is significant negative. This means that state-owned enterprises have significant learning ability at medium and low efficiency levels, and they are lagging behind in the high efficiency group or have a downward trend. This means that the performance and efficiency of some high-end state-owned enterprises in China are difficult to continue to improve, but may be self-sufficient and gradually decline. In summary, Chinese-funded enterprises have certain learning abilities, and high-end private enterprises have the potential to catch up with the frontiers of production efficiency.

This paper agrees that property rights are not the only input factors that affect learning ability, and the institutional environment also has important influences (S. J. Liu and Li, 1998)[36]. The advancement of marketization process can optimize resource allocation and promote the improvement of enterprise production efficiency (Fang ,2006)[37]. Institutional changes in the process of marketization have promoted technological spillovers of foreign capital (Jiang and Zhang ,2008; H. Y. Zhang ,2008)[38-39]. Then, with the development of the marketization process, will the learning ability of Chinese enterprises be improved, and can the catch-up process be accelerated?

The regional marketization index measured by (Fan et al. ,2011)[34] is a quantitative indicator used by most recent institutional studies. The index comprehensively measures the marketization process from the aspects of government-market relations, non-state-owned economic development, product market development, factor market development, market intermediary organization development and legal system environment. This paper sorts the average marketization process index of each region from 1998 to 2007, and marks them as high, medium and low in the marketization process. Then, according to Equation 4, each group is regressed to test the difference in learning effects of enterprises under different institutional backgrounds.

Table 7. Analysis of enterprise learning ability under different institutional backgrounds

	Low marketization process	Medium marketization process	High marketization process
Foreign	1.077***	0.953***	0.975***
	(0.029)	(0.015)	(0.007)
Private	0.739***	0.801***	0.847***
	(0.017)	(0.010)	(0.007)
τ *Foreign	-0.040***	-0.012***	0.012***
	(0.005)	(0.003)	(0.001)
τ * Private	0.003	0.055***	0.031***
	(0.004)	(0.002)	(0.001)
τ *State	-0.042***	-0.025***	0.008***
	(0.003)	(0.002)	(0.001)
No. of obs	106,435	279,148	917,561
No. of firms	37,692	104,772	299,798

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively. State-owned enterprises (State) are the benchmark groups. τ is the duration of the company in the different years of the sample period.

Table 7 reports on the learning capabilities of companies in different institutional contexts. The time trend item and the coefficient of the private enterprise τ * Private is 0.055 in the marketization process and 0.031 in the high zone. This means that private enterprises have significant learning ability in high marketization process areas, which indicates that the improvement of marketization process is conducive to the improvement of production efficiency of private enterprises. That is to say, with the development of marketization, the treatment enjoyed by private enterprises in investment and financing is gradually fair. These institutional environments are conducive to the development of private enterprises and the improvement of efficiency levels. Simi-

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larly, in the high-subsample regression of the marketization process, the time trend term and the coefficient of the state-owned enterprise τ * State are significantly positive. That is to say, the efficiency of state-owned enterprises in areas with high marketization progress has also increased significantly. Marketization has reduced the market information held by the government and strengthened the competition faced by state-owned enterprises (Guo and Yao, 2004)[40]. Competition can urge state-owned enterprises to improve effectiveness without changing property rights (Megginson and Netter, 2001)[41]. Marketization can gradually weaken the credit constraints of state-owned enterprises, and the weakening of soft budget constraints can help improve production efficiency (L. W. Huang and Yao,2007)[42]. In the process of marketization, the capital allocation efficiency of China's state-owned industrial enterprises has gradually increased (Fang, 2007)[43]. However, in the middle and low areas of the marketization process, state-owned enterprises are declining in efficiency due to various issues such as their monopoly status, soft budget constraints and government support. Foreign-invested enterprises also benefit from the marketization process. In the high zone, the τ * Foreign coefficient is significantly positive, but lower than the private enterprise τ * Private. This means that in areas with a high degree of marketization in China, private enterprises have higher learning ability than foreign-funded enterprises, and there is a trend of catching up with production efficiency. In general, the institutional environment in which the marketization process is gradually improved is more conducive to enterprises to improve their production efficiency. Therefore, this paper believes that market-oriented reform is an important source of productivity improvement for Chinese enterprises. The above compares and analyzes the changes in the efficiency of China's corporate property rights, and believes that the efficiency of China's China enterprises has improved. However, it has not directly analyzed whether China ally-funded enterprises can catch up with foreign-funded enterprises in the long run and gradually reach the frontier of world production efficiency. This section applies the convergence analysis method of economic growth to calculate the average efficiency steady state level and convergence speed between internal and foreign-funded enterprises, so as to study the efficiency convergence between different ownership enterprises. This will help to understand whether China companies have the potential to catch up productivity compares with others.

According to the data characteristics and research purposes, we apply the conditional β convergence model proposed by (BarroR. and SalaiMartinX, 2004)[44], and set the dynamic condition convergence model as follows:

$$\ln tfp_{it} = \kappa Z_{it} + \eta \ln tfp_{it-1} Z_{it} + \delta I_{it} + \nu P_t + \mu_{it} \quad (4)$$

Among them, tfp_{it} is the production efficiency of the enterprise, and is calculated by the industry using the LP method. Z_{it} is the ownership variable (including Foreign and Private), κ measures the steady-state efficiency level of firms of different ownership types, and η represents the speed at which different types of ownership firms converge to their respective steady-state levels. The calculation of the specific convergence rate β is a negative value of the natural logarithm of η; that is, when $\ln tfp_{t-1}$ is negative, the firm exhibits steady state convergence (see Appendix for the derivation process). I_{it} represents industry dummy variables that control industry-specific effects (eg, technical levels) affecting steady-state levels, and P_t is an annual variable. Equation (4) allows for differences in the steady state efficiency levels and the respective convergence speeds of firms of different ownership types.

Table 8. Conditional (β) Convergence Parameters for Enterprises of Different Ownership Types

	OLS_Robust	QREG	RE
Foreign	1.231***	0.982***	1.196***
	(0.019)	(0.010)	(0.012)
Private	1.217***	0.874***	1.174***
	(0.017)	(0.010)	(0.012)
$\ln tfp_{t-1}$	0.875***	0.947***	0.875***
	(0.002)	(0.001)	(0.001)
$\ln tfp_{t-1}$ *Foreign	-0.137***	-0.118***	-0.136***
	(0.003)	(0.001)	(0.002)
$\ln tfp_{t-1}$ * Private	-0.146***	-0.110***	-0.144***
	(0.002)	(0.001)	(0.002)
Constant term	0.926***	0.487***	0.796***
	(0.045)	(0.036)	(0.009)
R^2	0.645		
Pseudo R^2		0.451	
Within R^2			0.639
Between R^2			0.639
Overall R^2	.	.	0.646
Obs.	867,478	867,478	867,478

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively, and the state-owned enterprise (State) is the baseline group. The explanatory variable is the productivity in the form of ln, and tfp is the productivity in the first phase. In the IV-robust regression, dfp (the difference between the second phase of the productivity and the third phase of the lag) is used as the instrumental variable of tfp. The benchmark group is state-owned and controls industry and annual effects.

The first three columns of Table 8 report the results of us-

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ing OLS_Robust, QREG median regression, and RE random effects, respectively. The Foreign and Private coefficients obtained by different regression methods are significantly positive, indicating that the steady-state efficiency levels of different property rights enterprises are different. The steady-state efficiency values of foreign-funded enterprises and private enterprises are significantly higher than those of state-owned enterprises. However, the regression coefficient of Foreign is only slightly larger than Private, indicating that the gap between the steady-state efficiency of private enterprises and foreign-funded enterprises is not significant. Among the different regression methods, the coefficient of foreign-funded enterprises $\ln tfp_{t-1}$*Foreign and private enterprises $\ln tfp_{t-1}$* Private is significantly negative, which means that foreign-funded enterprises and private enterprises tend to converge toward their respective steady-state efficiency levels, but private enterprises converge faster. This is consistent with the strong learning ability of private enterprises found in Table 6. In the long run, private enterprises have the potential to catch up with efficiency. However, the coefficient of $\ln tfp_{t-1}$ is significantly positive, meaning that state-owned enterprises have not converge to their lower steady-state levels. What is the reason?

5. Efficiency Analysis of Newly Established Enterprises

One of the solutions to interpret the above problems is to study the efficiency of newly established companies. This paper recognizes the problems caused by the statistics of the industrial enterprise database of the National Bureau of Statistics. The newly entered enterprises are not necessarily newly established enterprises. We selected the companies that were established during the sample period, that is, the opening time of the company is equal to the screening method of the year, and we got a subsample of 47,052 newly established companies. Although the number of newly established state-owned enterprises is the least, 30.4% of them are distributed in the high-efficiency group; although the number of newly established private enterprises is large, the distribution of high-efficiency groups is only 15.2%.

Table 9 reports on the comparison between the newly established enterprises and the productivity of the incumbents. We found that the production efficiency of newly established state-owned enterprises is significantly higher than the state-owned enterprises in place at different efficiency levels. This may be an important reason for the difficulty of state-owned enterprises to converge to their own steady state. We further found that the newly established private enterprises are significantly lower than the private enterprises in place. Table 8 shows that private enterprises can converge to their own higher steady-state levels, which should be partly derived from the learning ability of newly established enterprises. We will examine it in Table 11. The gap between the newly established state-owned enterprises and foreign-invested enterprises reported in the lower half of Table 10 is smaller than the gap between the incumbent state-owned enterprises and foreign-invested enterprises. The gap between newly established private enterprises and foreign-funded enterprises has expanded compared with the incumbent enterprises. The gap between the newly established state-owned enterprises and private enterprises has been significantly reduced at different levels of efficiency, and is very close to private enterprises in the high efficiency group. This further illustrates that the newly established state-owned enterprises are significantly more efficient than the state-owned enterprises, while the newly established private enterprises are less efficient than the private enterprises in place. Table 10 also shows that the new foreign-funded enterprises are significantly lower than the in-transit foreign-invested enterprises in the low-efficiency level, and there is no significant difference in the medium and high efficiency levels. The efficiency level of foreign-funded enterprises is not high when they are newly established. This is related to the establishment of preferential policies for foreign-invested enterprises to enjoy super national treatment (Mao and Sheng, 2013)[19].

Table 9. Efficiency gap of newly established enterprises

Newly established company - Incumbent enterprise			
	Foreign	Private	State
Quantile 10	-0.132***	-0.093***	0.525***
Quantile 50	-0.005	-0.030***	0.200***
Quantile 90	0.005	-0.062***	0.051***
RE	-0.058***	-0.056***	0.369***
	Foreign-State	Foreign-Private	Private-State
Newly established company			
Quantile 10	0.584***	-0.150***	0.734***
Quantile 50	0.449***	0.132***	0.317***
Quantile 90	0.479***	0.336***	0.113***
RE	0.508***	0.139***	0.369***
Incumbent enterprise			
Quantile 10	1.560***	-0.060***	1.620***
Quantile 50	0.962***	0.095***	0.867***
Quantile 90	0.775***	0.224***	0.551***
RE	1.083***	0.091***	0.992***

Note: ***, **, and * indicate significant levels at 1%, 5%, and 10%, respectively.

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Table 10 examines the learning ability of newly established companies. In this regression, we excluded new companies that had ownership changes after 4.8%. The table finds that private enterprises have very strong learning ability in different levels of distribution, and the more efficient the enterprises are, the more obvious learning ability they can reflect. Foreign-funded enterprises are significantly better than private enterprises in the low-efficiency distribution group, but they are significantly lower than the private enterprises in the middle and high efficiency levels. Table 10 clearly shows that the newly established state-owned enterprises have no significant learning ability.

Table 10. Learning effects of newly established enterprises

	RE	QREG(10)	QREG(50)	QREG(90)
Foreign	0.508***	0.584***	0.449***	0.479***
	(0.022)	(0.051)	(0.021)	(0.037)
Private	0.369***	0.734***	0.317***	0.113***
	(0.021)	(0.040)	(0.017)	(0.030)
Foreign *i	0.069***	0.107***	0.082***	0.067***
	(0.003)	(0.003)	(0.003)	(0.005)
Private*i	0.098***	0.078***	0.092***	0.107***
	(0.002)	(0.004)	(0.002)	(0.005)
State*i	0.007	-0.007	0.007**	0.008
	(0.005)	(0.011)	(0.003)	(0.007)
No. of obs.	124,029	124,029	124,029	124,029

Note: The values in parentheses are the standard deviation of the coefficients, ***, **, and * indicate significant at the 1%, 5%, and 10% levels, respectively. State-owned enterprises (State) are the benchmark groups.

Therefore, one of the main sources of improvement in the efficiency of state-owned enterprises is that the newly established state-owned enterprises have higher levels of production efficiency, but because of the lack of learning ability, it is difficult for state-owned enterprises to catch up efficiency. Of course, in recent years, state-owned enterprises have had a high level of production efficiency at the beginning of their establishment, not only from the government's cautious attitude toward the establishment of new state-owned enterprises, but also from the inclination of national resources to newly established state-owned enterprises, including the allocation efficiency manager. However, the efficiency improvement of new state-owned enterprises is no longer significant. This means that the government's care for new state-owned enterprises is also a mismatch of resources. From the above, the way of Chinese enterprises catching up the efficiency from multinational enterprises is mainly depend on the learning abilities.

This paper uses big data and micro-data in many single industrial enterprises in China to systematically analyze the changes in production efficiency of enterprises of different ownership types, and draws the following conclusions: There is a big gap in production efficiency between China ally-funded enterprises in China and foreign-invested enterprises that represent the frontiers of world efficiency, but the gap is gradually narrowing. The reason is that on the one hand, China-funded enterprises have very significant learning ability, especially private enterprises; on the other hand, newly established state-owned enterprises are more efficient than existed state-owned enterprises. We further found that the improvement of the marketization process in the region where enterprises are located can promote China enterprises to improve their learning ability. Besides that, the results of convergence analysis show that the level of steady-state efficiency and convergence speed of private enterprises are very close to those of foreign-funded enterprises. This means that under the existing conditions, China's private enterprises have the potential to gradually catch up with the efficiency level of foreign-funded enterprises. Of course, this is by no means a one-size-fits-all thing. It requires the Chinese government to create a superior external environment for the learning and catch-up of private enterprises.

At the same time, among the newly established China-funded enterprises, state-owned enterprises have significantly better efficiency advantages than private enterprises at the beginning of their establishment, but they have insufficient learning and lack of stamina. Despite the high efficiency of the newly established enterprises and the exit of a large number of inefficient state-owned enterprises, the overall efficiency level of state-owned enterprises has been improved. However, although the introduction of state-owned enterprises has promoted the optimal allocation of resources, the establishment of new state-owned enterprises with insufficient learning ability is also an embodiment of China's resource allocation is not perfect. Of course, the deeper question is why state-owned enterprises have insufficient learning capacity, including newly established high-efficiency state-owned enterprises. The author of this paper believes that the possible corporate governance mechanism is an important way to answer questions, but there is no data to carry out specific and in-depth research. Last but not least, China should continue to promote the marketization process, provide a more equitable and relaxed development environment for the efficiency improvement and vitality of private enterprises, so as to achieve the efficiency catching of Chinese China enterprises.

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Empirical Research on the Influence of Export Market Diversification on Total Factor Productivity: Based on the Perspective of Trade Protection

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ABSTRACT

This paper mainly explores the impact of export market diversification as an important measure to deal with trade friction on firms total factor productivity. Firstly, this article focuses on the theoretical analysis of the impact mechanism, including risk diversification, reversal effect and spillover effect. Based on the sample data of Chinese manufacturing export enterprises from 2000 to 2007, this paper conducts an empirical test on the relationship between export market diversification and total factor productivity. The result indicates that export market diversification has a significant positive effect on the total factor productivity of enterprises. After considering the endogenous problem, by controlling the fixed effects, using the two-stage least square method and changing the duration of the sample for robustness analysis, the results are still consistent. In addition, the role of diversification policy in total factor productivity presents heterogeneous characteristics in terms of different types of enterprise ownership, export intensity, industry competition, trade methods, and the development degree of exporting market. Accordingly, this paper puts forward corresponding policy recommendations.

1. Introduction

At present, trade protectionism is increasing. The United States, Japan and other developed countries have imposed trade barriers on China. The outbreak of the Sino-US trade war in 2018 has further exacerbated economic downside risks facing China, and China's GDP growth rate in 2019 has dropped from 6.6% to 6%. Therefore, China urgently needs to take measures to reduce its over-reliance on certain markets and

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mitigate the negative impact of weak external demand. According to Chinese Customs statistics, the total export value in 2019 is 17.23 trillion yuan, of which the United States as China's second largest export market account for up to 16.7%, and China's top five exporting countries and regions account for 65.2% of the total export value, indicating that China's current export market structure is still relatively concentrated. Since the 1990s, China has always taken the diversification of export market as a national strategy to stabilize the risk of product export fluctuations. The 2019 "Report on the Work of the Government" has highlighted that "we should foster new strengths in international economic cooperation and competition, and work to diversify export markets." Given the current background of frequent trade frictions in China, the export fluctuation caused by external demand shocks will increase the downward pressure on China's economy. Therefore, implementing export market diversification is essential for stabilizing foreign trade and promoting steady economic growth.

Total factor productivity is not only an important measure of corporate performance, but also a variable which can reflect a country's economic development level and international competitiveness level. Whether based on a macro or micro perspective, the research on total factor productivity is of practical significance. At present, China is in a new period of economic transformation and upgrading, and international situation is becoming increasingly severe, so it is difficult to sustain the economic growth by simply increasing factor input, and innovation-driven development is fundamental. The "Report to the 19th National Congress of the Communist Party of China" has clearly pointed out that "China's economy has shifted from a stage of rapid growth to a stage of high-quality development and we should focus on increasing total factor productivity." From the micro level, the total factor productivity of an enterprise is a concrete manifestation of technological innovation capabilities, so the core of promoting high-quality economic development lies in the improvement of enterprise's total factor productivity. The diversification of export markets as a significant national measure for dealing with trade friction, aims to promote steady economic growth by stabilizing exports. However, export firms as the policy implementing subjects of the market diversification, still tend to export their commodities to the markets of some developed countries, which indicate that the diversification strategy has not been effectively implemented. Thus, exploring whether the export market diversification strategy can improve the level of Chinese enterprise's total factor productivity under the background of increasing trade protection is useful for promoting firms to implement diversification strategy, improving their own performance, and achieving high-quality economic development.

2. Literature Review and Mechanism Analysis

In recent years, a large number of scholars have focused on the influencing factors of total factor productivity. In addition, domestic and foreign researches on the diversification of export markets are quite abundant. This paper sorts out the relevant literature in turn, and summarizes the influence path of export market diversification on total factor productivity based on existing research.

2.1 Research on the Economic Effect of Export Market Diversification

On the economic effect of export market diversification, scholars mainly studied from the following aspects: Firstly, export market diversification can stabilize export fluctuations by reducing dependence on a single market[1], as export fluctuations are mainly caused by external demand shocks[2]. Companies expanding the export margin would inevitably face higher political risks and marketing costs[3], which may increase the risk of some companies failing[4]. Secondly, a series of cost changes brought about by opening up new export market can influence company's decision to enter or exit international market, and then it affects the efficiency of resource allocation among companies[5]. As an important national policy, market diversification has attracted much attention for its role in economic growth. Tongsheng Xu et al. (2008)[6] found that the increase in market development costs due to export market diversification can inhibit short-term economic growth, but in the long run, the improvement of diversification degree promotes economic growth by resisting external demand shocks.

2.2 Research on Influencing Factors of Total Factor Productivity

Many scholars have analyzed the impact of policy factors on total factor productivity at macro level, including industrial policy, trade policy, etc. China's current industrial policies are not inclusive, and government subsidies provided to inefficiency state-owned enterprises can exacerbate the mismatch of resources, which is not conducive to the improvement of total factor productivity[5]. Shenxiang Xie et al. (2017)[7] pointed out that anti-dumping barriers lead to the decline of total factor productivity of export enterprises by inhibiting its returns to scale and technological innovation. Academia generally believes that technological innovation and efficient resource allocation

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are internal factors that can promote the improvement of total factor productivity[8-10]. Some other literature hold that the uncertainty of economic policies affects companies' expectations of risks, causing companies to postpone R&D activities, which inhibits the increase in their total factor productivity[11-12]. On the other hand, some scholars concerned about the relationship between export trade and the total factor productivity starting from the micro level. Melitz (2003)[13] believed that the total factor productivity of export sector is higher than that of non-export sector, because export companies can gain advanced technology and fulfill economies of scope through international trade to stimulate productivity levels. Moreover, R&D investment is closely related to total factor productivity, which plays a positive role in promoting total factor productivity[9]. When factor market distortions and financing constraints cause the inefficient allocation of resources among enterprises, it will lead to the loss of total factor productivity[14-16].

2.3 The Influence Mechanism of Export Market Diversification on Total Factor Productivity

It can be seen from the above theories that a large number of current researches mainly focus on the influencing factors of total factor productivity and the direct economic effect of export market diversification. Research on the direct impact of export market diversification on total factor productivity is relatively scarce. In general, total factor productivity of China' enterprises can be stimulated through export market diversification strategy[8]. Xuefeng Qian et al. (2014)[17] concluded that there is a U-shaped relationship between total factor productivity and the diversification of export market, and China is currently on the left side of the U-shaped line. Based on existing research, three influence channels of this paper is proposed, so as to provide theoretical support for research in this field.

2.3.1 Risk Diversification Effect

In the process of implementing trade protection policy in developed countries, restricted export enterprises are confronted with weak market demand and export fluctuation, which can easily lead to distortions in the configuration of enterprises' factors, thereby it will hinder the level of productivity of enterprises[15]. Massol et al. (2014)[1] and Yabo Li (2018)[18] pointed out that market diversification can significantly reduce export volatility by diversifying risks. Therefore, it is easier to achieve economies of scale through the strategy of export market diversification[4], which is positively correlated with corporate performance, so companies will have sufficient funds for R&D expenditures. In addition, exchange rate appreciation and increased volatility risks not only bring about uncertainty in external market demand, but also reduce corporate R&D investment, thereby inhibiting corporate long-term productivity progress. An empirical study by Qiren Liu et al. (2017)[19] found that export market diversification is conducive to alleviating the adverse impact of exchange rate fluctuations on corporate R&D activities. The effectiveness of export market diversification in reducing export volatility is restricted by many factors, such as the scale of export[18], choice of export market[20], export duration[21] and institutional environment[22], etc. Export trade to developing countries has significantly promoted the improvement of total factor productivity in the eastern and central China[8]. Thus, it is conjectured that opening up new markets can promote the increase of total factor productivity under the risk diversification mechanism, but the actual effect may be uncertain, which is heterogeneous due to the differences in the institutional environment of the target market and the types of enterprises.

2.3.2 Reverse Effect

On the one hand, exporting products to multiple markets means that companies are facing diversified needs and fiercer competition. At the same time, they must pay high risk research costs and marketing costs to adapt to the needs of the destination country's market and related legal systems[4]. Fiercer competition and increasing costs can drive companies to carry out technological innovation[23]. The development of R&D activities is an important way to improve the technological level of enterprises, seeking to stimulate total factor productivity[24]. On the other hand, although the competitive pressure caused by export expansion has stimulated the innovation vitality of high-productivity enterprises, not all enterprises can overcome strong competitive shock[25]. Furthermore, the efficiency of R&D investment transformed into total factor productivity will be restricted by external factors, including government subsidies[16], credit allocation[24], etc. As highlighted by Ping Li et al.(2010)[26], the cost of imitation will increase further due to the intensification of competition, so low-productivity companies with higher financing constraints face the risk of bankruptcy. It is very likely to be forced to withdraw from the industry so that resources flow to high-productivity enterprises, and resource allocation is optimized to increase the total factor productivity of entire industry [13].

2.3.3 Spillover Effect

Companies can learn advanced experiences from other

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countries and gain technology spillover through export trade, which can accelerate their own technological innovation. Grossman and Helpman (1991)[27] believed that their firms' R&D innovation can be successfully promoted by imitating and absorbing the top technologies or knowledge of developed countries. Requester in the international market often have higher demands for product quality, so they tend to provide technical guidance or employee training to supply companies, which can improve the productivity of export companies[28]. Advanced technology and management experience in foreign markets can be diffused through international trade, which is conducive to stimulating the technological innovation efficiency and increasing the total factor productivity of export companies. Technological progress of the inferior export enterprise in turn drives first-mover enterprises to undertake new R&D activities, thereby realizing a virtuous circle. From the perspective of technology dissemination of foreign market to export companies, it is easier for companies to achieve technology spillover effect by expanding export destinations.

3. Models, Variables and Data

3.1 Model Setting

First of all, in order to examine the relationship between export market diversification and total factor productivity, this paper sets the following basic econometric model for regression based on existing theories and empirical research:

$$\ln TFP_{it} = \beta_0 + \beta_1 \ln gjexpnum_{it} + \beta_2 \ln scale_{it} + \beta_3 \ln age + \beta_4 \ln kl_{it} + \beta_5 \ln profit_{it} + \beta_6 tradereexch_{it} + \beta_7 \ln exp_{it} + \beta_8 izjpje_{it} + \beta_9 \ln rzys_{it} + \varepsilon_{it}$$

Where i and t represent company and year respectively. Specific explanations of the remaining variables are described below.

3.2 Variable Selection

3.2.1 Explained Variable: Total Factor Productivity (ln *TFP*)

In this section, the log value of total factor productivity is used as the dependent variable. First, we use the method proposed by Levinsohn and Petrin (2003) to calculate total factor productivity. The specific calculation process is as follows:

$$v_t = \alpha_0 + \alpha_l l_t + \alpha_k k_t + \omega_t + \eta_t = \alpha_l l_t + \phi_k(k_t, m_t) + \eta_t$$

Among them, $\phi_k(k_t, m_t) = \alpha_0 + \alpha_k k_t + \omega_t(k_t, m_t)$, t denotes time periods. v_t denotes value added. l_t, k_t and m_t denote labor input, capital input and intermediate input. The capital variables and output variables involved in the calculation process are measured by the value of fixed assets and industrial added value, and intermediate industrial input are used as a proxy variable, while fixed asset investment price index, the ex-factory price index of industrial producer and the purchase price index of fuel and power industrial producers are adopted to convert the above three variables (using 2000 as the base period). The total number of employees in the enterprise is used as a measure of labor input. The corresponding data are from Chinese Industrial Enterprise Database and National Statistics Bureau Website.

3.2.2 Core Explanatory Variable: Diversification of Export Market (ln *gjexpnum*)

We draw on and improve the practice of Huiwen Yi et al.(2014)[29], using logarithm of the number of export countries plus one as a measure of the export market diversification, in order to avoid too many missing values in the regression process.

3.2.3 Control Variables

In this paper, we selected the additional independent variables based on the previous research as follows:

(1) $\ln scale$ represents the size of enterprise, which is measured by the natural logarithm of the number of employees in the company.

(2) $\ln age$ represents the age of the enterprise, subtracting the year of establishment of the enterprise from the current year and add one, then taking the logarithm to get it.

(3) $\ln kl$ is the capital to labor ratio of the enterprise, which is obtained through deflating the annual average net value of fixed assets by using the fixed asset investment price index based on the year 2000 , and then dividing by the number of employees.

(4) $\ln profit$ represents corporate profit rate, which uses total profit divided by total assets, in order to measure enterprise's business performance.

(5) $tradereexch$ is trade-weighted real effective exchange rate. Previous studies have shown that fluctuations in the exchange rate level lead to changes in the relative prices of two countries' commodities, which affect the export behavior of enterprises. We use the approach proposed by Mi Dai and Bingzhan Shi (2013)[30] to calculate the effective exchange rate at the enterprise level according to the trade weight, the specific formula is as follows:

$$tradereexch_{it} = 100 \times \prod_{i=1}^{n} \left(\frac{e_{kt}}{e_{k0}} \times \frac{P_{CHt}}{P_{kt}}\right)^{w_{ikt}}$$

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Where e_{kt} represents the nominal exchange rate between RMB and k national currency at time t under indirect pricing method, this means that 1 unit of RMB is converted e_{kt} units of. k national currency, so the increase of e_{kt} under this measurement method indicates the appreciation of RMB; e_{k0} is the base period exchange rate, with 2000 as the base period. P_{CHt} and P_{kt} represent the consumer price index of China and the k country respectively, with 2000 as the base period. w_{ikt} is the trade share between the company i and the country k. The data are from the China Customs Import and Export Database, the UNCTAD database of the United Nations Conference on Trade and Development website and Penn World Table 7.1.

(6) $\ln exp$ is export trade value.

(7) *izjpje* represents the total price of imported intermediate products. The import of intermediate products can bring technology spillover effects to enterprises, which can help enterprises to increase their total factor productivity. In addition, the import of intermediate products to a certain extent can drive the export of enterprises.

(8) *rzys* is financing constraints. Companies facing a higher degree of financial constraints may reduce R&D investment, thereby inhibiting total factor productivity. This paper uses the proportion of company's total liabilities in total assets to measure the degree of financing constraints. The larger the value of the financing variable, the stronger the ability to raise funds and the lower the risk of capital interruption.

3.3 Data Description

China Industrial Enterprise Database and Customs Import and Export Database are used to collect the sample data from 2000 to 2007. We merge the two databases by firm name, and the matching samples were processed as follows: Excluding samples of companies with less than 8 employees. Eliminating the sample with zero or negative value in any of the annual average balance of net fixed assets, total assets, industrial intermediate input, fixed assets, total industrial output value, and industrial added value. Eliminating enterprises samples whose age is less than or equal to 0. Excluding samples with industry codes 06-11 and 44-46, and only retained manufacturing enterprises with export behavior.

4. Empirical Results and Analysis

4.1 Benchmark Regression

This paper first uses least squares method (OLS) to perform a full sample regression, whose regression results are shown in the first column of Table 1. Following upward, the second column reports the regression results after controlling for industry fixed effects, region fixed effects, and year fixed effects to eliminate the time trend of variables. The total factor productivity level has an inverse causal relationship with the choice of enterprise export behavior, including the choice of export markets quantity. In order to further improve the robustness of the results and avoid the endogenous problems caused by the two-way causality between variables, this paper selects the one-period lag of the number of export countries as an instrumental variable and uses the two-stage least squares method (2SLS) to perform a regression test, whose results are recorded in the third column of Table 1. It is difficult to observe the impact of export diversification on companies that have exited the export market due to the discontinuity of corporate export behavior. In order to reduce the possibility of bias in sample estimation coefficients caused by it, this article only retains samples of companies that have export behaviors for five consecutive years or more during the sample period for OLS regression, and the results are shown in column 4 of Table 1.

As illustrated in Table 1, the coefficient of the number of export countries in the OLS regression is significantly positive. Whether to control the fixed effects, to use the 2SLS method or to conduct a robustness test with a duration sample, the coefficient of the export diversification variable is still positive, and all pass the significance test at the 1% level. It means the increase in the export market diversification can obviously promote the improvement of enterprises total factor productivity. Overall, companies exporting products to more countries can improve their productivity level, which can be fulfilled through diversification of volatility risks, competitive incentives and technology spillovers.

Among the control variables in this paper, the estimated coefficients reflecting the internal characteristics of the enterprise are significantly positive, including enterprise scale, enterprise age and capital-labor ratio, which may benefit from firm's rich production experience and stronger resource organization ability, and the improvement of technical efficiency also contribute to higher productivity. The impact of external financing level and corporate profit rate on total factor productivity presents a positive effect, indicating that companies with strong financing capabilities and good operating performance can freely increase R&D funding to improve productivity, but the variable coefficients of these two variables in the fixed effects regression are significantly negative, which may be due to the unreasonable allocation of corporate funds, because the use of ample funds for projects with relatively poor growth results in low resource allocation efficiency. In addition, it can be found that trade-weighted real effective

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exchange rate level significantly promote the improvement of corporate productivity. Although the negative impact of external demand hinders the realization of the scale effect in corporate exports, the decline in product competitiveness forces companies to increase productivity through innovation. Thus, the actual effect of the exchange rate on productivity depends on the relative strength of price effect and reversal effect. Moreover, the total amount of imported intermediate products and export trade value are positively associated with total factor productivity.

On the whole, the coefficients of 2SLS regression variables are basically the same as the results of OLS regression, only the coefficients of enterprise age estimation are different. The results of OLS regression using duration samples are still robust and consistent with the results of OLS regression in full sample regression.

Table 1. Benchmark Regression Results

Independent variables	Total factor productivity			
	OLS	*FE*	2*SLS*	*OLS*2
ln *gjexpnum*	0.055***	0.045***	0.046***	0.056***
	(23.12)	(10.28)	(13.89)	(15.92)
ln *scale*	0.273***	0.122***	0.270***	0.255***
	(147.3)	(26.46)	(113.9)	(85.07)
ln *age*	0.015***	0.281***	-0.034***	0.047***
	(5.516)	(61.66)	(-8.658)	(9.999)
ln *kl*	0.170***	-0.012***	0.192***	0.212***
	(123.4)	(-4.123)	(109.9)	(97.81)
ln *rzys*	0.021***	-0.013***	0.025***	0.054***
	(9.359)	(-4.445)	(8.734)	(15.14)
ln *izjpje*	0.005***	0.006***	0.007***	0.007***
	(17.32)	(10.61)	(16.34)	(13.40)
tradereexch	0.045***	-0.002	0.037***	0.053***
	(9.735)	(-0.263)	(6.055)	(6.110)
ln *profit*	0.014***	-0.006***	0.024***	0.025***
	(17.65)	(-8.533)	(24.18)	(20.47)
ln *exp*	0.060***	0.097***	0.080***	0.093***
	(53.66)	(53.44)	(50.89)	(47.63)
C	2.110***	3.088***	1.900***	1.387***
	(84.20)	(70.19)	(56.62)	(30.67)
Industry effect	NO	YES	YES	NO
Region effect	NO	YES	YES	NO
Year effect	NO	YES	YES	NO
N	271784	271784	164111	101507
R2	0.1951	0.08312	0.2217	0.2524
F	7320.0	1790.3		3807.3

Notes: *, **, *** Significant at the 10%, 5%, and 1% levels. The t value of the estimated coefficient are in parentheses, same below.

4.2 Analysis of Heterogeneity

Considering that the relationship between export market diversification and the level of total factor productivity shown by different types of enterprises may be heterogeneous, we conduct group inspections on the samples, which were divided based on the type of enterprise ownership, the level of industry competition, export intensity, export trade methods and the development degree of export market.

4.2.1 Regression Results of Different Ownership Types

Table 2. Regression results of different ownership types

Independent variables	(1) State-owned enterprise	(2) Foreign enterprise	(3) Private enterprise
ln *gjexpnum*	0.042***	0.065***	-0.032***
	(5.356)	(21.91)	(-6.329)
ln *scale*	0.318***	0.253***	0.284***
	(64.53)	(99.75)	(70.76)
ln *age*	-0.097***	0.060***	0.048***
	(-15.17)	(15.21)	(8.554)
ln *kl*	0.158***	0.182***	0.121***
	(32.26)	(109.1)	(38.06)
ln *rzys*	-0.124***	0.051***	-0.087***
	(-13.26)	(18.90)	(-16.02)
ln *izjpje*	0.019***	0.007***	0.013***
	(18.87)	(16.76)	(17.58)
tradereexch	0.028**	0.020***	0.073***
	(2.205)	(2.849)	(9.889)
ln *profit*	-0.001	0.012***	0.052***
	(-0.272)	(11.88)	(30.16)
ln *exp*	0.060***	0.063***	0.083***
	(17.04)	(44.75)	(33.34)
C	2.102***	2.068***	2.047***
	(29.07)	(57.35)	(43.82)
N	30065	178303	51073
R^2	0.2740	0.1927	0.1989
F	1260.2	4729.2	1408.3

There are differences in the resources available to enterprises of different ownership types and their ability to withstand external shocks. Based on this, we divide the overall sample into state-owned enterprises, foreign-owned enterprises, and private enterprises according to ownership types, and carry out grouping tests to examine the role of export market diversification in enterprise productivity, whose results are recorded in columns 1-3 of Table 2 respectively. The results indicate that the level of total factor productivity increases with the expansion of the scope of export in state-owned enterprises and foreign-owned enterprises, but the regression coefficient of the export diversification in private enterprise group is significantly negative. This may be driven by more

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government subsidies, stronger financing capabilities and more reasonable choices of export market direction in state-owned enterprises, while private enterprises have a higher proportion of small and medium-sized enterprises, whose problem of financing difficulties is particularly prominent. As private companies lack the accumulation of export experience and are vulnerable to political risks in the new market, which result in the loss of total factor productivity.

4.2.2 Regression Results of Different Export Intensities

In view of the fact that the proportion of export trade volume of enterprises in overall sales may affect the relationship between export behavior and the total factor productivity of enterprises, this paper uses median export intensity within the sample as the boundary to divide the sample data into two groups of high and low for regression. From columns 1 and 2 of Table 3, it can be found that increased export diversification is accompanied by higher total factor productivity regardless of the export intensity of a company. In a comprehensive comparison, export market diversification has a more positive effect on total factor productivity in a sample of high export intensity. This result reflects to a certain extent that export trade is not the main channel to improve their business performance for companies with low export intensity, so there is not enough incentive to open up new markets, and the technology spillover effects obtained are limited. However, enterprises with high export intensity rely more on export trade and have sufficient motivation to integrate resources from multiple markets to achieve better resource allocation, making the effect of implementing market diversification strategies more obvious.

4.2.3 Regression Results of the Degree of Competition in Different Industries

It is likely that company's behavioral decision is affected by the competitive environment of the company's industry when it faces negative shock from external demand. Therefore, this paper is based on the degree of industry competition for group estimation. Therefore, we examine whether the effect of export market diversification on productivity varies with the degree of industry competition. In this section, Herfindahl-Hirschman Index (HHI) is used to measure the intensity of industry competition and a higher HHI indicates that the industry in which the company is located is less competitive. The regression results are illustrated in the third and fourth columns of Table 3, indicating that the estimated coefficients of export diversification variables are significantly positive in both groups. The results also show that the firms located in a less competitive industry have lower total factor productivity. As companies enter more export markets, they face more fierce competition than before and industry competition further aggravate the survival risks of firms, which result in a stronger desire to maintain competitive advantage and promote productivity through technological innovation. It can be said that the compelling effect of competition caused by the export market diversification is more obvious in companies with higher levels of industry competition.

Table 3. Regression results of different export intensity and industry competition

Independent variables	Export intensity		The degree of industry competition	
	Low intensity	High intensity	High competition	Low competition
ln *gjexpnum*	0.032***	0.038***	0.068***	0.036***
	(8.177)	(16.71)	(21.26)	(10.76)
ln *scale*	0.245***	-0.214***	0.220***	0.304***
	(97.39)	(-81.97)	(86.60)	(119.2)
ln *age*	-0.004	0.029***	0.022***	0.012***
	(-1.123)	(9.396)	(6.018)	(3.187)
ln *kl*	0.133***	-0.066***	0.135***	0.184***
	(65.00)	(-41.48)	(73.25)	(95.08)
ln *rzys*	-0.050***	-0.015***	0.010***	0.028***
	(-14.53)	(-6.453)	(3.287)	(8.567)
ln *izjpje*	0.020***	-0.009***	0.001	0.008***
	(45.83)	(-25.79)	(1.616)	(18.71)
tradereexch	-0.043***	0.022***	0.049***	0.032***
	(-7.407)	(3.867)	(7.987)	(4.847)
ln *profit*	0.027***	-0.006***	0.014***	0.014***
	(24.49)	(-7.834)	(13.11)	(12.04)
ln *exp*	0.102***	0.684***	0.068***	0.055***
	(64.93)	(291.3)	(43.55)	(36.05)
C	2.485***	-3.427***	2.394***	2.045***
	(78.83)	(-99.12)	(70.24)	(58.73)
N	135880	135904	141747	144292
R^2	0.2379	0.5004	0.1430	0.2280
F	4711.5	15125.6	2627.2	4733.4

4.2.4 Regression Results of Different Export Trade Methods

We examine whether the effect of export market diversification on total factor productivity is related to the way companies trade. To accomplish this, we filter out samples of companies that only engage in general trade and

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companies that only engage in processing trade for group regression, and the estimated results are listed in the first and second columns of Table 4. The results show that total factor productivity increases with the expansion of the scope of exports in enterprises engaged in general trade, if the firm is engaged in processing trade, export market diversification can inhibit the improvement of total factor productivity. The reason may be that enterprises engaged in processing trade mainly rely on cheap labor to obtain weak processing profits, and they lack the enthusiasm for R&D innovation and technological improvement compared with general trading enterprises, which makes it difficult to realize learning effect and return to scale in exports. Therefore, the cost of entering new markets is higher than the benefits for enterprises engaged in processing trade, resulting in a low level of productivity.

4.2.5 Regression Results of the Degree of Development of Different Exporting Markets

The relationship between export market diversification and total factor productivity may be different due to the different choices of the export market geographic direction. In order to eliminate the bias of the estimated coefficients caused by frequent entry and exit of enterprises from the international market, this article adopts enterprises sample that have been exporting for five consecutive years or more and divides the sample into two types according to the degree of export market development, and then we perform a group estimation. As illustrated in the third column of Table 4, the coefficient of export market diversification is not significant. This shows that the increase in total factor productivity caused by enterprise's export expansion to developed countries is not obvious. At the same time, regression results of the sub-sample of enterprises exporting to developing countries, the variable coefficient of the number of exporting countries is positive, and it has passed the significance test at the 10% level. This may be because of the improvement in total factor productivity caused by the technology spillover effects obtained from developed markets has been offset by the negative impact of the deteriorating trading environment. Furthermore, when companies begin to open up markets in developing countries, it can reduce their reliance on developed countries' technology and help stimulate their motivation for independent innovation. At the same time, it can reduce the risk of export fluctuations, which is conducive to the improvement of business performance. These all contribute to the improvement of total factor productivity. As the conclusion shows, expanding the export share of enterprises to developing countries is effective in improving total factor productivity.

Table 4. Regression results of different trade methods and the degree of development of export market

Independent variables	Export trade method		The degree of development of export market	
	General trade	Processing Trade	Export to developed countries	Export to developing countries
ln *gjexpnum*	0.011***	-0.020***	0.007	0.066*
	(2.878)	(-3.309)	(0.711)	(1.730)
ln *scale*	0.277***	0.248***	0.244***	0.282***
	(108.2)	(47.04)	(46.05)	(15.34)
ln *age*	0.002	0.036***	0.033***	0.014
	(0.671)	(4.633)	(3.980)	(0.545)
ln *kl*	0.099***	0.168***	0.174***	0.163***
	(46.44)	(48.93)	(46.84)	(10.72)
ln *rzys*	-0.043***	0.087***	0.060***	-0.0001
	(-12.14)	(18.09)	(10.80)	(-0.004)
ln *izjpje*	0.035***	0.034***	0.008***	0.018***
	(65.60)	(21.86)	(8.781)	(4.972)
tradereexch	0.051***	0.183***	-0.010	0.019
	(9.456)	(9.833)	(-0.485)	(0.423)
ln *profit*	0.021***	-0.011***	0.011***	0.024***
	(18.52)	(-6.038)	(5.299)	(3.024)
ln *exp*	0.051***	0.073***	0.046***	0.018*
	(33.01)	(25.97)	(15.82)	(1.833)
C	2.658***	1.018***	2.589***	2.738***
	(83.26)	(11.52)	(27.51)	(10.60)
N	124554	44285	36570	2448
R^2	0.1867	0.2066	0.1330	0.1575
F	3176.2	1280.7	623.2	50.66

5. Conclusions and Policy Recommendations

From the perspective of theoretical analysis, the implementation of export market diversification strategy can promote the improvement of total factor productivity through multiple channels such as diversifying the risks of export fluctuations, obtaining technology spillover effects, and forcing enterprises to conduct R&D and innovation. However, the inability of enterprises to bear the fixed costs of opening up new markets and competitive pressures will hinder the improvement of total factor productivity.

Based on the matching data of the China Customs Import and Export Database and the Industrial Enterprise Database, this paper selects a sample of manufacturing export enterprises from 2000 to 2007 to empirically test the relationship between export market diversification and corporate total factor productivity. The study finds that the degree of export market diversification has a sig-

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nificant positive impact on the total factor productivity of enterprises. After considering the endogenous problem, the regression results are still robust. The results of heterogeneity analysis indicate that the positive effect of export market diversification on total factor productivity is stronger in state-owned enterprises and foreign-owned enterprises, enterprises with higher export intensity, enterprises engaged in general trade, and enterprises with fierce competition in the industry. Among private enterprises and enterprises that only engage in processing trade, the increased diversification of export markets hinders the growth of total factor productivity. In addition, only exporting to developed markets cannot effectively promote total factor productivity.

In view of the conclusions of this paper, it is believed that China should continue to adhere to the export market diversification strategy to promote the improvement of firms total factor productivity and economic growth in the current environment where trade frictions are frequent and economic transformation is imminent. Secondly, due to the positive effect of export market diversification on total factor productivity is not applicable to private enterprises, China cannot blindly encourage all enterprises to adopt export market diversification strategy. At the same time, efforts should be made to improve financing environment for small and medium-sized enterprises, in order to alleviate the negative impact caused by corporate insufficient funds. Moreover, the government should focus on general trade exports and building a good business environment. Finally, considering that the marginal expansion of exports to developing countries has a more significant effect on the improvement of total factor productivity, firms should pay attention to the choice of export geographic direction, and the government should give appropriate policy guidance.

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Research on the Promotion Mechanism of "Innovation-Capital" Interactive Co-operation——Taking WuXi AppTec As an Example

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ABSTRACT

Based on the case of WuXi AppTec, this paper explores the mechanism of private innovative enterprises to realize enterprise value growth through innovation-capital interaction in the framework of life growth cycle. This paper constructs a mechanism of interactive coexistence of innovation and capital, which has certain enlightenment and reference significance for innovative enterprises to realize technology catch-up and improve their independent innovation ability through capital operation.

1. Introduction

In December 2019, an outbreak of Novel coronavirus pneumonia(NCP) caused a serious threat to people's lives and health, and whether there is a vaccine to prevent it has become a matter of great concern. On February 25, 2020, YaoMing Biologics, a subsidiary of WuXi AppTec, announced that it had reached a co-operation agreement with Vir Biotechnology on the development and production of the vaccine. WuXi AppTec, the parent company of YaoMing Biologics, was founded in 2000, listed in New York Stock Exchange in 2007, delisted in 2014 and listed in A-share market in 2018. It is the only

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China Concept Stock (CCS)[①] listed to A-share market in the way of "Approval as soon as Reporting", and successfully listed in Hong Kong in the same year. In just 18 years, how did WuXi AppTec grow into a "Unicorn" in the CRO industry of China? Why can WuXi AppTec become the only one that listed through "Approval as soon as Reporting"? Is its success accidental or inevitable?

From the perspective of the enterprise life cycle, the interactive co-operation of WuXi AppTec's innovation and capital operation has undergone four stages: enterprise initiation and original innovation, M & A expansion and secondary innovation, privatization and integration innovation, and Cross-listing and continuous innovation. The innovative output formed becomes the endorsement of capital, so based on the innovation output, WuXi AppTec can get financing. In the meantime, these financing fed back as innovation input. Through such a continuous virtuous cycle, WuXi AppTec not only realized the evolution of independent innovation ability from original innovation to continuous innovation, but also achieved the continuous growth of enterprise.

2. Analysis on the "Innovation-Capital" Interactive Co-Operation of WuXi AppTec

2.1 Enterprise Initiation and Original Innovation

Before the reform and opening up, medical level in China was poor, the CRO business was also totally blank in 2000. Li Ge[②] saw this situation, and he wanted to change. He quit his job in the United States and returned to China to create WuXi AppTec. With his rich experience in the field of medicine, he led WuXi AppTec to establish a set of service systems different from traditional medicine enterprises, starting from the outsourcing of pharmaceutical R&D services to providing integrated laboratory R&D and production services. At this time, WuXi AppTec's innovation mainly came from Li Ge and his team's intellectual capital, which belonged to the category of original innovation. At the same time, relying on its original innovative strength, WuXi AppTec began to actively seek financing from external investors to alleviate the financing constraints.

Table 1. Financing sources of Wuxi AppTec in the initial stage

Date	Financing Amount	Financing Round	Investor
07/01/2005	$2.21 million	Series A	Tiandi Capital, UOB Venture Management, Fidelity International
10/01/2006	$19.2 million	Series B	Eight Roads, Tiandi Capital, UOB Venture Management
02/01/2007	$54.5 million	Series C	Eight Roads, General Atlantic

WuXi AppTec has attracted talents at home and abroad, strengthened innovation service, and attracted investment with high-quality service and innovation mode, initially forming the path of "innovation attracts capital, capital feeds innovation". In August 2007, WuXi AppTec listed on the New York Stock Exchange, raising more than 185 million dollars, known as "Wall Street pays for China's brain for the first time".

2.2 M & A Expansion and Secondary Innovation Stage

The US stock market provided WuXi AppTec a more open and broad financing platform. With the help of international capital market, WuXi AppTec acquired M & A with advanced technology, absorbed external technology team and carried out secondary innovation in combination with the original innovation ability.

Tbble 2. The company acquired by WuXi AppTec from 2007 to 2014

Year	Acquired company	Characteristics
2007	Chemdepo	Chemical compound provider
2007	Abgent	Biological reagent supplier
2007	Jiecheng, MedKey	Clinical research service company
2008	AppTech	Provider of biological services and medical facilities
2014	XenoBiotic Laboratories	R & D service company for bioanalysis, drug metabolism and pharmacokinetics

In this stage, the innovation of WuXi AppTec manifested as merger and acquisition. Through the support of capital market, it acquired enterprises with advanced technology and absorbed external technology to support its secondary innovation.

2.3 Privatization and Integration Innovation Stage

However, the development of WuXi AppTec was not smoothly. Although continuous mergers and acquisitions could make enterprises expand rapidly, Wall Street fol-

① China Concept Stock refers to a company registered and listed overseas, but the largest controlling (usually more than 30%) or the actual controller is directly or indirectly subordinate to a private enterprise or individual in mainland China.

② Li Ge, graduated from Peking University, and obtained a doctor's degree in organic chemistry from Columbia University. He is the founder of Wuxi AppTec , the largest outsourcing service company for new drug research and development in China, and has served as the chairman and CEO until now.

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lowed the principle of "cash as king". So they are very doubtful of the sustainability of this development model. The stock price of WuXi AppTec kept falling and its market value was undervalued. In response, Li Ge expressed with great disappointment "we want to keep innovation, but we can't get positive incentives. I think it's time to delist."

In December 2015, WuXi AppTec completed the privatization with the consideration of $3.3 billion dollars and officially delisted. In this process, WuXi AppTec introduced several new strategic investors to support its integrated innovation.

Table 3. Financing sources of Wuxi AppTec in the initial stage

Date	Financing Amount	Financing Round	Investor
04/01/2016	￥10 million	Strategic Financing	New Alliance Capital, Highlight Capital
11/09/2016	￥19 million	Strategic Financing	Eight Roads, Tiandi Capital, UOB Venture Management, Legend Capital
01/24/2017	Undisclosed	Strategic Financing	Taikang, Huatai Securities, China Life PE, YF Capital, Huaxing Growth Capital

By introducing new strategic investors through privatization, WuXi AppTec successfully acquired upstream and downstream industries to expand diversified business. The investment layout included innovative biotechnology, artificial intelligence, transformative technology and medical health information technology.

2.4 Cross-Listing and Continuous Innovation Stage

In February 2018, the CSRC announced that it would relax the approval standards for unicorn enterprises in four new economic fields, including biotechnology, cloud computing, artificial intelligence and high-end manufacturing. Based on the previous good capital operation and innovation accumulation, WuXi AppTec successfully seized this policy dividend and listed in May 2018, raising more than 2.25 billion yuan. In December of the same year, WuXi AppTec officially listed on the Hong Kong Stock Exchange and raised about 7.5 billion Hong Kong dollars.

With "A+H" cross-listing, WuXi AppTec's capital operation capacity has been greatly enhanced. Through increasing R&D investment, merger and acquisition, and cooperation with other innovation platforms, WuXi AppTec continuously improves its innovation ability and maintains its competitiveness.

3. Summary and Conclusion

Based on the case study of WuXi AppTec, we can expand to innovative enterprises. According to their own development stage, enterprises can reasonably use capital operation means to promote enterprise financing to support innovation, and realize the evolution of independent innovation ability through the coexistence of innovation and capital. When enterprises invest in innovation, due to the existence of financing constraints, enterprises will face the problem of insufficient innovation investment, and the financing environment and conditions faced by enterprises at different stages of development are different. Enterprises need to judge their own stage and financing environment according to their own development status. Technological innovation will indirectly provide enterprises with chips to break through financing constraints in the way of increasing enterprise value, so enterprises can obtain external equity financing in the capital market to support the innovation and development of enterprises. Under appropriate circumstances, enterprises can choose to privatize or split business, respectively listed to build financing channels of multiple capital markets, so as to alleviate financing constraints, continue innovative investment, and increase the competitiveness of enterprises.

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Intangible Property: Protection of Virtual Property in Electronic Games in China and US

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ABSTRACT

With blossoming of the electronic games, the strategy of game developer preference is that the player uses real money to buy the virtual property in the game. The purpose for the strategy which keeping the game promote and developing the game system on the platform to attract more users.

With the increasing amount of game, the main strategy is same. The chain, the End User License Agreement (EULA) which between the game developer and player is vital. EULA used to rule that the virtual property is belong to the game developer. However, for now, the virtual property has different acquisition way, "all virtual property belongs to the developer" since already unfair.

Staring from the first virtual property lawsuit in China, this paper introduces the virtual property of electronic game and legal protection in US and China. Second, discussion the reasons to protection virtual property and provide proposals for a potential legislative solution in China. At the end, this paper presents the reason that copyright law not suitable to protect the virtual property.

1. Introduction

A company cannot kill the virtual asset trading industry, OPSkins said.[①] OPSkins is the world's largest third-party trading platform, but also out of 50 billion dollars of fat every year. OPSkins quickly became the largest secondary market in Steam's game asset community by virtue of its own advantages, which is undoubtedly a robbery for Steam.[②] Valve, the parent company of Steam, the world's largest digital game distribution platform, banned OPSkins trading robots on June 21, 2018.[③] In order to change the current dilemma, OPSkins chose to start the block chain project - preparing to start WAX Trade.[④] It has to say that the free trade of virtual property has already appeared, which the general trend is. But the ownership of virtual property is still be tortured by EULA.[⑤]

① Arielle, *Official Statement Regarding Valve & OPSkins Steam Accounts,* OPSKINS (Jun 09, 2018), http://blog.opskins.com/official-statement-regarding-valve-opskins-steam-accounts/.

② Arielle, *Official Statement Regarding Valve & OPSkins Steam Accounts,* OPSKINS (Jun 09, 2018), http://blog.opskins.com/official-statement-regarding-valve-opskins-steam-accounts/.

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In China, 2003, Hongchen Li prosecuted Arctic Ice; the cause was that Li's properties related to the game was lost because of the third-party software (plug-in) he used; Hongchen Li brought an action against the game developer to recover his game equipment. This is the first case related to virtual game in China. The court deemed that the developer had obligation of contract to protect the player property, but the property related to the game could not be measured through actual currency, so Arctic Ice should help the accuser to regain his game property except which damage caused by plug-in.①

Since "the first case about virtual property", virtual social space becomes increasingly mature as information technology is developing; online game industry has shown its huge value.② Online virtual property emerges as the online game develops, and it is significant for both game developer and players.③ It is normal to exchange virtual properties in network world that items related to game from equipment to ID could be bought with actual currency because they are sold on marked price; some people even live on playing game for others. As online game is creating huge market value, a series of disputes related to online virtual property occur. Till 2016, China did not have any legislation which admitted virtual property. Regulations about virtual property were normally shown to player through End User License Agreement (EULA), which stipulated that virtual property belonged to game developer, and game developer had right to reserve all rights. Until 2017 when General Rules of the Civil Law of the People's Republic of China was enacted, the Article 127 stipulates: "Provisions should be followed once there are provisions related to protect data and online virtual property." ④This is the first time for China to admit that virtual property is protected by law in the form of written law. However, what is the nature of virtual property? What is its scope? Does it belong to players or developers? What kind of legal system should be used to protect it? All of these are not clear.

In the last few years, a new form of valuable "property" has been emerging. Property created and used in the virtual realm of video games is often given real-world value, and as a result, there has a bridge between the virtual economies with real-world market. Despite its intangible nature, the virtual property can carry physical and intellectual property rights both. Normally, the developers of electronic gaming worlds generally retain these rights via ELUA. In the past, those agreements have been held to be enforceable. However, policy reasons may be emerged. The part I describes the problem the legislator need to consider how to treat the ownership of virtual property and whether they can divide rights only under the EULA.

To understand the concept of virtual property, that is important for us to divide with the real property. "Normally, virtual property is simply computer code."⑤ The computer content have different expression of codes. The represent of virtual property computer code is "designed to act more like land or chattel".⑥ The original virtual properties in the online world included "domain names, URLs (uniform resource locators), websites, [and] e-mail accounts".⑦ Such property "consists of computer code and it can be sold among entities."⑧ The virtual property in electronic game is equipment, virtual coin, role of game players and so on.⑨

Not only in China, but also around the world, because of the development of major virtual games and the improvement of public acceptance, the target audience of virtual property is not small. The Virtual worlds is more often referred to as Massive Multiplayer Online Role-Playing Games (MMORPGs). Today, the virtual world has surpassed any expectations to enter the main Entertainment Centers: Some of them are 'virtual homes' for hundreds of thousands or even millions of subscribers, and the most famous World of Warcraft reaches 7,5 million (Blizzard Entertainment, 2006). The numbers have transformed them from a simple combat-oriented game to a mature virtual environment where players participate in various social activities. As expected, it has attracted people's attention for future potential of these virtual environments raises the question of how to treat the virtual world legally. The virtual world has changed from a pure game to a virtual place

① Li Hongchen Su Beijing Arctic Ice Technology Development Co., Ltd. [Li Hongchen v. Beijing Arctic Ice Technology Development Co., Ltd.], 2004 Beijing Second Intermediate People's Ct. Dec 17, 2004).

② Hu Yifeng, Nian Nian Mianbi Tu Po BI: Woguo Wangluo Youxi Yanjiu (1998-2018) de Guiji, Fanshi Yu Quxiang *Twenty Years of Wall Breaking: Track, Paradigm and Trend of China's Online Game Research (1998-2018)*] Article Judgement]22-23 (10, 2018).

③ Hu Yifeng, Nian Nian Mianbi Tu Po BI: Woguo Wangluo Youxi Yanjiu (1998-2018) de Guiji, Fanshi Yu Quxiang *Twenty Years of Wall Breaking: Track, Paradigm and Trend of China's Online Game Research (1998-2018)*] Article Judgement]22-23 (10, 2018).

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⑤ Joshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

⑥ Joshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

⑦ Joshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

⑧ Joshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

⑨ Joshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

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where people work or create culture, so they have reasonable expectations for the virtual products of their labor.[①]

For the cases of virtual property disputes, the courts can directly show how to judge whether virtual property is of real value in the process of practice in various countries. In Black snow Interactive v. Mythic Entertainment Inc., Black snow Interactive, a small development company.[②] They rented office space in Tijuana, equipped with computers and T1 lines, and hired three Mexican laborers to play online computer games from punch to exit time.[③] The games they need to play are Camelot in the Dark Ages of the Ultima Online Desert, which are online massively multiplayer role-playing games.[④] When workers operate their characters in the game, they can earn the skill and gold. Black snow calculates the wages of the workers in piece count, then they sell senior characters and makes money on eBay.[⑤] The Grandmaster Grayson-tamer account from Ultima is sold for $200.[⑥] However, developer found this situation and closed the game account.[⑦] The issue in the case: Who own the game equipment? Developer or players?

In the example cases, this is the first case about virtual property in U.S history, "the Black snow was lost in the case. The Federal Trade Commission did not support Black snow's defense but fined it for $10000."[⑧] Under the case, Ed Felton, a Princeton professor notes that "our world becomes increasingly virtual, more over our property will become virtual—and increasingly under copyright protection."[⑨] As owners of virtual property, Felton argues, "we need to start challenging its privileges as intellectual property".[⑩] However, the United States have more favored to protect virtual property as a legal property. Therefore, the End User License Agreement (EULAs) are especially important for the protection of virtual property.

In China, the first case about the virtual property, the court hold that virtual property cannot be compensated equally by real money. In Li Hongchen v. Beijing Arctic Ice Technology Development Co., Ltd., the service contract dispute between the player and the game developer was provoked due to an online game in the case of Li Hongchen (hereinafter referred to as "Li") suing Beijing Beijibing Science and Technology Development Co., Ltd. (hereinafter referred to as "Beijibing").[⑪]

This court confirmed the evidence submitted by Li and further affirmed that the regulations of Red Moon had failed to be presented in an appropriate manner when the player entered into this game for the first time.[⑫] Due to the fact that the notarial deed provided by the company failed to certify the situation at that time, the regulations of Red Moon should not be regarded as a contract signed between the two parties and the legal basis for the rights and obligations of both parties.[⑬] Obviously, for gamers, such result is not enough to make them satisfied.

For short mention, the key question is whether the EULA should allow the player become owner? Basic on the 30 cases in China, we can clearly see the rules of EULA is not equal. The EULAs are usually a threshold for developers before players enter the game. It can be said to be the key to open the virtual world door for games. The content of the agreement stipulates the rights and obligations between the developer and the player. For example: The World of Warcraft: The company reserves any rights to the game.[⑭] Players don't care about this rule when they first enter the virtual world, but as the player's input into the game consumes energy, the player's expectation of the game is much more than just

① oshua Fairfield, "*Virtual Property*" (2005) 85 B.U.L. Rev. 1047 at 1049.

② *Black Snow Interactive and the World' s First Virtual Sweet Shop,* JULIAN DIBBELL (Jan 2019), http://juliandibbell.com/texts/blacksnow.html.

③ *Black Snow Interactive and the World' s First Virtual Sweet Shop,* JULIAN DIBBELL (Jan 2019), http://juliandibbell.com/texts/blacksnow.html.

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⑭ Blizzard End User License Agreement, North America (Jun. 1, 2018), https://www.blizzard.com/en-us/legal/fba4d00f-c7e4-4883-b8b9-1b4500a402ea/blizzard-end-user-license-agreement (last visited Apr.28, 2019).

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the time they first entered.[①] They hope to sell Game account in the real world, buy other players' equipment use real money.[②] They are in order to upgrade quickly, get more rewards in the game.[③]

Beside we can change the owners of virtual property in EULA, we also can argue whether the copyright law can provide protect for it.

Currently, the China legal system is hard to support the argument. General Rules of the Civil Law of the People's Republic of China, the article 123(2) have limit for subject matter of intellectual property, all subject have the common both are intellectual achievements.[④] However, I can't denied that the produce of virtual property is similar with Bitcoin. Bitcoin requires "miners" to compete for accounting rights in a specific time. Because the randomness of the Hash Algorithm itself, the computing power of "miners" is required, but the result are hardly to see have any human intelligence.[⑤]

The creation of virtual property comes from the date provided by the game itself. Take Second Life as an example, when developers attract game players into the game, they have said that the virtual land property you create in the game belongs to their players, and the players have the right to make profits through the virtual property.[⑥] Players actually pay a certain amount of real money to Linden when they acquire the virtual property of the game. Players are free to buy virtual land, build homes and islands, and other players need to pay a certain amount of money to enter the field. But at present, if only on the basis of the game itself, the virtual property types that the game itself does not provide are not original. Because no matter how the player manufactures it, it all comes from the game date provided by the developer.

Based on the analysis above, I think the virtual property itself cannot be the object of copyright protection for the following reasons: first, in China, the object of copyright protection is literary, artistic and scientific works, and these works should be original, and can be copied in some tangible way. Secondly, the time limit of copyright protection object is more harmful than beneficial to the rapid development of game business. Thirdly, assuming that a virtual property can be protected by copyright law, copyright law protection easily delays, which can easily limit the development of game and the enthusiasm of developers. Therefore, in this scenario, the current Chinese law and even the United States cannot be recognized, the copyright law cannot protect the virtual property. However, we can make a presumption, If the future game allows certain players to develop their own, players can use formulas to create original data to load the game, then create virtual property, and be allowed to enter the game by developers. I think it may can be the protection object of this kind of virtual property type of formulas as copyrightable. However, the dates cannot be protectable by copyright law, but the player who design the game role weapons and clothes may can be protectable by copyright law.

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Research on the Importance of Monetary Work to the Political Development of the Western Hunan and Hubei Base Areas

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ABSTRACT

During the seven years revolution in the Western Hunan Hubei revolutionary base, currency experienced four stages of construction and development, and became the economic tool of revolutionary regime, and made considerable contribution; however, the importance of politics to financial work is obvious here. Due to the mistakes caused by the left leaning in the revolutionary work, the monetary work in the revolutionary base area in Western Hunan and Hubei has been seriously affected the final result of the influence is to withdraw from the circulation field with the transfer of the main body of the revolutionary team.

1. Introduction

During the period from the beginning of 1930 to the end of 1931, eight financial institutions were set up in the revolutionary base areas of Western Hunan and Hubei, These eight financial institutions have issued currency to stabilize and develop the financial work in the base areas, and have achieved certain results. The monetary and financial work in the revolutionary base area of Western Hunan and Hubei has gone through four stages, from construction to development, and then to being affected by political mistakes, which reflects the full support of economic work to revolutionary struggle and the role of politics in economy.

2. A Study on the Course of Monetary and Financial Work in the Base Areas of Western Hunan and Hubei

Gradual progress is the characteristic of monetary and financial work in the Western Hunan Hubei base area. In the seven years of the base area's existence, the development of its monetary and financial work can be roughly divided into four stages in chronological order.

The first is the inheritance of old coins from 1928 to the beginning of 1930. The inheritance of the old currency is mainly due to the lack of material basis. At this time, although the revolutionary regime in the base areas had a certain amount of armed forces, it still had to deal with the encirclement and suppression of the Kuomintang and the interference of the forces launched by the local tyrants and evil gentry. There was no stable environment for economic work to be carried out. The revolutionary regime had little material resources to save. Guns, ammunition, medicine and food needed to be purchased from places outside the base areas, so they did not have the ability to set up their own In order to avoid unnecessary confusion and uneasiness in these two or three years, the peasants and small businessmen in the base areas used to use gold, sil-

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ver and old money because they had just entered the revolutionary life. Therefore, in order to avoid unnecessary confusion and uneasiness, the monetary policy adopted by the revolutionary base areas in western Hunan and Hubei was the temporary old currency system. At the same time, they actively constructed banks and issued money Material base preparation.

The second stage was the period from March 1930 to October 1930. In the past ten months, with the further development of the revolutionary regime and the further development and consolidation of the base areas, the Soviet governments were established one after another. With the commander of economic work, we have the precondition of financial work. In view of the situation that bad money is rampant in the market and miscellaneous notes are full of, Jianli County and Mianyang County are the first to issue credit bonds. Then, Shishou county and Hefeng County successively set up banks and issued their own currency. In April, the three counties combined with Jiangling County and Qianjiang County to set up the western Hubei Rural Bank, expanding its scale. Although the amount of credit notes issued by these banks is small and the circulation area is small, they have strong flexibility. This is a beginning and a stage of exploring experience. The shortcomings are arbitrariness and decentralization. Of course, there is nothing to criticize, because the situation at that time forced it. Due to the lack of professional financial personnel in the base area and the lack of a full understanding of the supporting role of monetary reserve for the issue of paper money, at this initial stage, the issue of currency is very arbitrary, and there is no necessary procedure for printing and issuing. It is enough to write and stamp. Dispersion was due to the military and political situation at that time. During this period, the Kuomintang launched a relatively strong force. The military encirclement and suppression and the tight economic blockade made it difficult for the development of economic life. The survival of the revolutionary base areas was quite difficult. The distance between each small base area was as high as hundreds of miles, which was particularly unchanged. The administrative bases had not yet been unified, so there was no unity in economic work. However, with the expansion of the base troops, the demand for funds is also increasing. In this case, only relying on the income of war can not support the demand for military expenditure. Only under the existing conditions can we develop economy, trade and issue currency in their respective bases. Although this kind of dispersion would cause resentment among some of the masses, in the revolutionary environment at that time, to a certain extent, it was conducive to the struggle against the enemy, because even if the base areas were occupied and banknotes were seized, the enemy could prevent them from taking them to buy goods from other base areas.

Then, from October 1930 to the next summer, the issue of currency was fully launched. With the establishment of the Xilian county government, the sphere of influence of the revolutionary base area has expanded to more than 20 counties, and the scale is quite magnificent, which provides sufficient conditions for the development of monetary and financial work. In view of the confusion in the past, the county government decided to continue to issue paper money in the name of the western Hubei Rural Bank, and other banks stopped issuing paper money. After the unified issue, the financial work was carried out in an orderly manner, miscellaneous currency and old currency gradually withdrew from commodity circulation, industry and commerce were developed, and trade activities outside the base area were carried out, which expanded the financial resources of the base area, made the economic work effective, and strengthened the material reserve foundation, which strongly supported the revolutionary struggle work.

The final stage of monetary work in the base areas of Western Hunan and Hubei can be summarized in two words: out of control, which is the result of the joint action of natural disasters and man-made disasters. Natural disasters are floods. Besides the Kuomintang government's encirclement and suppression of strong troops, there are also Wang Ming's leftist adventurism mistakes. In November 1931, the branch of Xiangexi special zone was established and issued banknotes. However, due to the severe situation and the lack of control over the circulation, the currency devalued and even could not be exchanged for silver dollar at all. Although the devalued banknotes were recovered and new banknotes were stopped to be issued, there was no time for the market chaos to be corrected, because the failure of the anti encirclement and suppression led to the loss of Honghu Soviet Area, followed by the loss of the Hunan Hubei border Soviet area. The currency lost its main body and was forced to stop and withdraw from the circulation field.

3. On the Characteristics of Monetary and Financial Work in the Western Hunan and Hubei Base Areas

During the revolutionary war, all work was centered on military struggle, and so was monetary work. The monetary and financial work in the revolutionary base areas of Western Hunan and Hubei should also serve the needs of the revolution.

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First of all, the monetary and financial work in the revolutionary base area of Western Hunan and Hubei developed in the same direction as the revolutionary development in the base area. It was established and constructed with the scale of the development of the revolutionary regime. It was not only the product of economic development, but also political, reflecting the requirements of the times of revolution. The paper money issued in the Western Hunan and Hubei base areas, like other revolutionary bases, always and everywhere reflects the service to the revolutionary struggle. For example, in the design of the tickets, the revolutionary propaganda and cultural slogans were designed, and the revolutionary requirements, the head portraits of Marx and Lenin, the sickles and axes of workers and peasants were printed on the tickets. When the masses come into contact with the banknotes issued by the banks in the base areas, they will be able to understand the revolution and receive publicity and education.

The second is the scattered currency issued in accordance with the situation, which brings another characteristic of monetary work in the revolutionary base areas of Western Hunan and Hubei is regional independence. The revolutionary bases in Western Hunan and Hubei are composed of different small bases with Honghu as the center. Due to the encirclement and blockade of hostile forces, it is difficult to communicate and unify the financial work among these bases in time. In order to survive in their respective base areas, there has been a phenomenon of issuing paper money. Of course, this situation is not a long-term solution, and it is easy to cause confusion and arouse the disgust of the masses. But there are two sides to everything. This relative independence, on the one hand, enabled the small base areas to rely on themselves and survive without the support of their superiors under the arduous revolutionary conditions, and to accumulate strength for future unification and expansion of the revolutionary scale. On the other hand, the strength of these small base areas is still very weak compared with the enemy and may be transferred at any time. Therefore, the paper money left in the transfer is not unified with other base areas and is not recognized by other base areas. Even if the enemy seizes them, it will be of no use and will not cause the loss of revolutionary materials.

Another characteristic is that the importance of reserves was realized after the autumn of 1930, which made the financial work have a certain stability. We can see from the documents issued by the Soviet government at that time and the regulations related to currency. For example, the old money and gold and silver seized in armed struggle should be stored and kept by banks, with various taxes as guarantee, and the government's public welfare funds as reserves. With the reserve fund, the exchange of paper money can be realized, and the masses will have confidence and build trust in the banknotes in the base areas that can be exchanged at any time. When money has credibility, it has room for survival.

4. The Historical Role of Monetary and Financial Work in the Base Areas of Western Hunan and Hubei

Like the monetary work in other revolutionary bases, the greatest contribution to the revolution was to raise funds. After the establishment of the revolutionary base areas, the Red Army did not have much strength to put into production if it wanted to participate in the fighting and defend the Soviet area. In this case, provision becomes a big problem. At the beginning of the revolution, the Soviet government was responsible for the military expenditure. Most of the revenue of the Soviet government was obtained by beating down local tyrants and others, and part of the revenue was obtained through low tax rates. It is impossible for the revolutionary regime to apportion and levy taxes like the Kuomintang regime, so the issue of paper money is a solution to the problem. In the process of issuing paper money, although there were additional issues, resulting in a certain credit crisis, but it was able to raise part of the military expenditure, which played a positive role in the preservation of the revolutionary forces in the special revolutionary struggle at that time.

Secondly, it promoted the construction and development of financial work in the base area of Western Hunan and Hubei, promoted the economic life of the base area, and was beneficial to the consolidation and further development of the Soviet regime. Before 1930, the Western Hunan Hubei base area was unable to carry out the productive revolution in economic activities under the dual blockade of military and economic forces by hostile forces. The market was controlled by hostile forces, cash was occupied by speculators and local tyrants and evil gentry, and the value of old currency was unstable. With the expansion of political power, banks and capital of hostile forces were confiscated, usury and old pawns, which were exploited by the masses, were abolished. The base areas issued their own paper money and formulated their foreign trade policies. Many policies have made the financial work in the base areas carried out and the whole economic field has been active. After the summer of 1931, the currency was issued in a unified way. In view of the good reputation of the Red Army's currency in the market, merchants in the hostile areas were also willing to use the paper money of the base areas for trade settlement. The

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market became increasingly active.

Then, the masses are the biggest beneficiaries of the economic development in the base areas. The Soviet government not only defended and protected the masses militarily, but also strictly prohibited usury, pawn, and corvee and other labors that affected the quality of life of the masses. In order to support the poor people to carry out production activities, they provided low interest loans, and in order to improve the poor people's livelihood, they set up consumer cooperatives to provide cheap living goods. In the summer of 1931, when the flood came, the government of the base area provided as much help as possible to the masses. In addition to low interest loans to help the victims buy seeds and farm tools, they also sold water conservancy bills to all possible enthusiasts in the hostile areas to raise funds to help the masses build dams. Every month, the Soviet governments at all levels added 30% of their fiscal revenue to the embankment repair fund. After more than half a year's construction, the masses saw that the levees destroyed by the flood were rebuilt and the river channels were dredged. They firmly believed in the ability of the Soviet government and strengthened their confidence to follow the Communist Party of China.

5. Experience of Monetary and Financial Work in the Base Areas of Western Hunan and Hubei

The monetary and financial work in the revolutionary base areas of Western Hunan and Hubei has left valuable experience. First of all, after the establishment of the revolutionary regime in the base areas, it is necessary to issue currency immediately, abolish the old unreasonable market structure, and establish a financial work system, which is conducive to establishing the positive characteristic image of the political party as soon as possible, stabilizing the masses and restoring the production and life of the masses. Secondly, we must unify the right to issue currency. Although the advantages of decentralized currency issuance have been stated in the previous paragraph, its defects are obvious. It is because of the revolutionary situation at that time that we do not criticize the disadvantages of decentralized issuance. The disgust of the masses for a variety of Soviet banknotes will directly reduce the credibility and image of the Soviet government, and directly affect the mass basis for the survival of the regime. Therefore, when the revolutionary situation is grim, we can temporarily leave aside the issue because of the benefits of decentralized distribution, but this kind of opinion of the masses can never be shelved for a long time. Due to the relatively sufficient fund, the western Hubei Rural Bank unified the issue of currency to be exchangeable at any time and established the credit of the new currency. In this way, the trust of the masses was strengthened and the trust in the Soviet government was also strengthened and consolidated. Another experience is to maintain the independence of monetary and financial work. The government and financial departments can not withdraw money from banks until they have to. After the summer of 1931, due to the loss caused by the left deviation in political work, the Soviet government mistakenly led to the deterioration of military and financial conditions, and the finance had to withdraw money from banks. This caused the issue of paper money out of control, and the value of the currency rapidly depreciated. The masses had a lot of opinions. As a result, the monetary work in the revolutionary base areas of Western Hunan and Hubei was seriously affected, and the final outcome was to withdraw from the circulation field with the transfer of the main body of the revolutionary team. Therefore, money has its own working principles, which should be strictly followed. Economic work is very important for politics, although it is the economic foundation. However, the influence of politics on economy can not be ignored. Political mistakes will directly lead to the crisis and collapse of economic work. Therefore, monetary work should be relatively independent and the impact of political mistakes should be minimized.

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Research on Tax Planning of PPP Projects in China: Based on the Perspective of Digital Economy

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ABSTRACT

The digital economy has become an important driving force for the growth of fiscal revenue in various countries. Tax planning is essential for the cost accounting of PPP projects, reducing corporate tax burdens, and increasing company value. This paper adopts a case analysis method, taking the smart highway PPP project in Guizhou Province as an example. Through statistical analysis, it is found that the value-for-money and big data of the PPP project affects tax planning, the project's value-added tax input and output items have time mismatches, and enterprises Income tax payment imbalance. In the context of the digital economy, the tax planning of China's PPP projects can be further improved: digital transformation and big data to prevent tax risks caused by value for money evaluation; based on digital technology to improve the value-added tax deduction chain, and digital communication platforms to alleviate time mismatch of value-added tax; use big data to monitor and balance project portfolio investment; improve the level of digital skills of financial personnel.

1. Introduction

The great development of the digital economy requires the full and in-depth participation of diverse organizations such as governments, enterprises, and individuals. The sustainable development of the digital economy requires a good fit between an active government and an effective market. Public Private Partnership (PPP Model) is an important governance tool in the development of the digital economy, reflecting that public finance is an important pillar of national governance. China began to promote the PPP model in the 1980s, which played an important role in the development of China's urbanization, sustainable poverty reduction, and efficient provision of public services. According to data from the PPP project database of the Ministry of Finance of China, as of May 2020, there are a total of 9,459 projects in the PPP project management database, with an investment of 14.4 trillion yuan. In the context of the digital economy, China

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advocates new infrastructure construction and service orientation. The government uses big data, digital transformation, and information technology to promote the intelligentization of public services in underdeveloped areas and enhance citizens' sense of access to public services. The PPP model has the advantages of making up for the government's insufficient funds for public infrastructure construction, overcoming the inefficiency of the government's self-providing public goods, and effectively guiding enterprises to participate in the supply of public services[1].

The combination of the digital economy and the PPP model provides new requirements and development opportunities for China's fiscal and taxation system reform, modern corporate governance model, and smart public service supply. The development of the digital economy highlights the shortcomings of China's current fiscal and taxation systems and practices, which are reflected in the insufficient systemization of fiscal and taxation policies in the PPP model; the legal policies and practices of taxation planning for PPP projects are still in the exploratory stage. In response to the above problems, this research takes the digital economy as the perspective, based on the theory of tax fairness and efficiency balance, and adopts a case study method to analyze the tax planning problems and risks of China's PPP model.

2. Literature Review

The PPP model is a long-term cooperative relationship established by the government and enterprises. A partnership is to clarify the rights and obligations of parties through signing a contract. The project is based on a payment mechanism to stimulate the advantages of participants and provide public services to the public in a sustainable and stable manner. The PPP model enables the government to focus on core regulatory and policy-making functions through procurement. Cooperative enterprises give full play to their management and financing advantages to provide citizens with higher-quality public services in a manner consistent with market laws. The effective implementation of the PPP model enables the government, enterprises and citizens to achieve a win-win cooperation. Tax planning refers to taxation activities in which taxpayers must comply with tax laws and regulations, and through reasonable plans, enable taxpayers to achieve the goal of saving taxes, deferring taxes, reducing tax risks, and maximizing tax benefits, while maximizing corporate after-tax profits.

Scholars have conducted research on digital economy, PPP projects and tax planning. Studies have focused on the impact of public-private partnerships in the development of urbanization in the United States on taxation, and emphasized the importance of tax planning in PPP projects[2]. Public-private partnerships emphasize the structural compatibility of partner organizations, and should attach importance to effective communication between enterprises, schools, and individuals[3]. Tax cuts for public-private partnership (PPP) projects are conducive to reducing the cost of enterprises and increasing the value of the project. National legislation is of great significance to the formation of partners[4]. In the development of the digital economy, it is necessary to clarify the relationship between taxation theory and public economics, and pay attention to government expenditures and redistribution taxes in the supply of public products[5]. The government builds a partnership for community protection and management of natural resources, which is conducive to enhancing the country's competitiveness[6]. Based on the public-private partnership model of the Russian natural resources sector, studies have found that the government should provide tax incentives for investors in infrastructure development and implementing environmental measures[7]. The use of digital technology in tax planning is of great significance. Studies have used specialized data sets and executive compensation information to examine the relationship between tax directors, effective tax rates, tax gaps, and taxation measures[8]. Studies have analyzed the tax effect of financing in PPP projects[9]. Government taxation policies should be conducive to public-private partnership tax-paying enterprises to achieve value for money[10]. The design of the communication technology platform for government information is of great significance to the development of the digital economy. The PPP model aims to establish a sustainable online system to reform property tax collection methods and data collection management[11]. Scholars analyzed the legal and financing issues of Slovakia and other EU members from 2006 to 2014, and explained the importance of PPP project financing for tax planning[12]. The article reviews the background and important perspectives of infrastructure, public project partnerships, and tax development[13]. Scholars analyze public-private investment partnerships based on efficiency estimation methods, which have important implications for the efficiency of tax planning[14]. Studies have been conducted on corporate income tax incentives for PPP projects to assess the compatibility of income tax and investment law[15]. Based on the analysis of tax policy optimization of the PPP model, the study found that China currently has no specific tax policies

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or guidelines for PPP. Researchers put forward suggestions for optimizing tax planning for the PPP model: China should formulate targeted taxation rules based on the particularity of the PPP model; the government should formulate taxation practice guidelines for the PPP model; tax planning policies should give full play to the advantages of the government and enterprises, and promote Service quality and efficiency[16].

In summary, current research focuses on the importance of PPP projects to achieve value for money in public services, and the lack of tax planning policies in PPP projects. It rarely combines specific cases to discuss the status quo, problems and specific responses of PPP project tax planning in the digital economy. This research focuses on academic and practical problems, and has important value and innovation.

3. Risk Analysis of Tax Planning in Intelligent Highway PPP Project

3.1 Reason Analysis of Case Selection

According to the project database of the Ministry of Finance of China, among the national demonstration PPP projects in Guizhou Province, transportation projects and investment finance account for the largest proportion. On the one hand, Guizhou Province is an important transportation hub in the southwest region, with abundant resources and significant transportation development; on the other hand, Guizhou Province is in a large-scale development stage and there are shortcomings in transportation infrastructure. The transportation PPP project is to make up for the shortcomings of public services. Transportation PPP projects reflect the development needs of China and Guizhou Province, and are of great significance to promote the economic development of China's underdeveloped regions. The combination of transportation and digital economy is in-depth and common, and smart transportation PPP projects are representative, which has important reference value for discussing tax planning issues in PPP projects.

Guizhou Intelligent Expressway PPP project has a large investment amount and the cycle is as long as 30 years. The project reflects the innovation requirements of the digital economy in the construction and operation stages, and has strong demonstration significance and promotion value. The intelligent highway PPP project in Guizhou Province aims to make up for the shortcomings of transportation services, monitor transportation operations and revenue through digital and intelligent technologies, and improve transportation efficiency and people's travel convenience. Smart transportation projects generally adopt the payment method of Viability Gap Funding. When users are not paying enough, the government will provide subsidies to ensure the continuous income and operation of the project company. The government monitors the operation and income changes of transportation projects through digital technology, which can maximize the value of the project. In the operation of the intelligent highway PPP project in Guizhou Province, digital technology will feed back the operation period of the transportation project to the government department, and the government will promptly provide subsidies and supervision based on the revenue and tax data of the transportation project. The transportation PPP project company uses big data technology to track the operation of vehicles throughout the full life cycle, cooperates with the transportation department to deal with traffic conditions and accidents, and effectively adjusts tolls. The tax planning of the smart highway PPP project in Guizhou Province involves project procurement, construction, operation, and handover stages, reflecting the full life cycle of the project, and providing a representative and high-value sample for tax planning.

3.2 Risk Analysis of Tax Planning for Intelligent Transportation PPP Project

3.2.1 The lack of Big Data for Value-For-Money Evaluation Will Reduce the Effectiveness of Tax Planning

The government adopts the PPP model to provide public transportation services. The essential reason is that the PPP model can achieve better value for money. The value for money of a PPP project should be reflected in the entire life cycle of the project, including qualitative analysis and quantitative evaluation. Due to the lack of data samples, PPP projects mainly focus on qualitative of value for money. The general consensus between academics and practice is that only the quantitative evaluation of projects based on big data can truly reflect value for money. Value-for-money evaluation is currently dominated by the government. Cooperative enterprises mainly refer to the qualitative evaluation results of value-for-money provided by the government. The enterprise has little influence on the project evaluation process. In terms of project tax planning, the PPP project company's taxation behavior is based on changes in the project's market value. Without big data to support value for money, it is difficult to evaluate the operational valuation of PPP projects. In the project

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procurement stage, the government may overestimate the value of the highway project concession rights, and the company will pay extra money for obtaining the concession rights, making the tax planning of the project deviate from the real situation. In order to reduce the pressure on taxes and fees, enterprises may adopt non-compliant methods to avoid taxation, which will eventually lead to tax losses and affect fiscal revenue. The lack of big data for value for money will affect the tax planning and effectiveness of PPP projects.

3.2.2 Mismatch in the Input and Output Tax Time of the Project's Value-Added Tax

In the early stage of the intelligent transportation PPP project, there are many infrastructure construction tasks, and a large number of contracts need to be signed with other construction units or cargo providers. The project company's purchase of engineering, goods, and labor services will generate a large amount of input value-added tax (VAT), and the project company's book accounting has a relatively large input allowance. During the construction period of the project, the project company has invested heavily in construction, and its external sales amount is very small. The project company's output tax usually needs to be deducted several years after the operation period, and this process has a large time span. Input VAT cannot be deducted during the construction period, which brings huge financial pressure to enterprises. The input and output VAT in PPP projects have a prominent time mismatch problem. This requires the PPP project company to make tax planning arrangements in advance to prevent the company from facing the risk of paying the output VAT in full. In addition, during the project operation stage, the company' s main source of income is closely related to the government' s feasibility gap subsidies and user fees, which also requires tax planning arrangements.

3.2.3 Imbalance of Corporate Income Tax Payment at Different Project Stages

The construction period of PPP projects is relatively short, usually 2-3 years, and the operation period is long, usually 8-28 years. The initial investment cost of the project is too large, and it can only obtain stable income year by year through long-term operation, and it is difficult for enterprises to make up for the huge deficit through short-term operation. The operational characteristics of PPP projects have led to losses in the early stage of operation. As an independent legal person, the PPP SPV cannot use the profits of other projects of the group to reduce losses, which will increase the corporate income tax burden and increase the cost of capital occupation. According to the "Enterprise Income Tax Law of the People's Republic of China", "Losses incurred in the tax year of an enterprise may be carried forward to subsequent years, but the carry-forward period shall not exceed five years." If the PPP project company's losses have not been fully compensated after 5 years, then the profits and losses will not be offset in subsequent years, which will increase the income tax burden of the entire project cycle. Through bank financing, the tax treatment of loan interest capitalization affects the company's tax payment. Tax planning involves the inclusion of loans in financial expenses or construction in progress, or deductions based on actual conditions.

3.2.4 The Time Value Affects the Changes of Tax Base

The time span of a PPP project lasts for 10-30 years, and companies must fully consider the time value cost when making long-term investment decisions. Due to the expansion of generalization, bank loan interest, and market changes, companies must consider the time value of funds when making tax planning. The company's financial indicators continue to change with the project operation time, and transactions between the company and its stakeholders will be affected, which will have a direct impact on the tax planning of PPP projects. Project transaction time, transaction payment method and future cash flow status are important factors that affect the company's actual tax burden. The timing of tax payment has led to changes in the results of tax planning, which requires companies to make reasonable capital accounting arrangements to cope with financial pressures.

3.2.5 Risks of Tax Policy Changes Related to PPP Projects

The rapid development of the intelligent transportation PPP project provides an important opportunity for the domestic economic cycle and brings new momentum to the innovation and development of enterprises. To promote the development of the market economy, the government usually introduces appropriate tax policies. Taxation plays an important role in regulating macroeconomic development and micro enterprise entities. For PPP project companies, the adjustment of tax policy will bring uncertainty to tax planning and increase the

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difficulty of corporate tax planning. The adjustment of the VAT rate, the costs and financial indicators related to the VAT of the intelligent transportation PPP project company have all changed, which requires timely adjustment of financial statements and revision of tax planning plans. In the context of the digital economy, tax policy changes will accelerate. PPP projects should pay attention to preventing tax policy risks and responding to new requirements of the digital economy.

4. Conclusion and Research Recommendations

Based on the analysis of tax planning cases for intelligent transportation PPP projects, the study found that China needs to improve the value-for-money big data, VAT deductions, corporate income tax, and digital capabilities.

4.1 Prevent the Negative Impact of Value-for-Money Evaluation through Digital Transformation of Professional Agencies

China is vigorously building big data for government affairs, which is conducive to solving the digital divide between government departments and the accumulation of big data for PPP projects. The quantitative evaluation of value-for-money of PPP projects is inseparable from big data technology and big data applications. Professional big data companies use block chain and artificial intelligence technology to enhance the scope and depth of big data application. With the support of big data, the value for money assessment of PPP projects will be more accurate, and the correctness and predictability of corporate tax planning will be greatly improved. Digitally transformed governments and intermediary companies provide first-hand data for corporate tax planning. The combination of practical experience and big data by companies will effectively reduce the impact of value-for-money evaluation on corporate tax risks. Smart PPP project companies follow market rules and the commercial laws of the digital economy, and can better guarantee the sustainable operation of PPP projects. The tax planning of PPP projects based on big data must not only reflect the development of the digital economy, but also have sufficient financial resources to advance the project.

4.2 Improve the VAT Deduction Chain Based on Digital Technology

The VAT planning of the PPP project company is designed based on the current tax law. During the tax planning process of PPP projects, it was discovered that China currently has no specific tax policies related to PPP projects. The tax planning of the project company mainly follows common tax laws and regulations, which lacks pertinence. PPP projects involve many fields and large amounts, which are different from the tax issues involved in ordinary goods and services. The Chinese government can use big data technology to conduct a thorough evaluation of PPP projects, analyze taxation issues in the implementation of existing PPP projects, and formulate targeted policies and operating guidelines. In terms of tax planning for PPP projects, the issue of VAT deduction is the main contradiction in the development of enterprises. The particularity of PPP projects makes the existing VAT regulations difficult for project development needs. The sustainable operation of PPP projects should be supported by digital technology. The government allows enterprises to effectively finance based on digital credit, reduce their financing costs, and hedge the problem of VAT deduction. The government allows enterprises to adjust the value-added tax deduction chain, and allows them to expand the scope, link, and exemption of value-added tax for PPP projects.

4.3 Digital Communication Platform Promotes Effective Communication between Enterprises and Governments

The continuous operation of PPP projects requires effective communication between the government and enterprises. A reasonable and scientific digital communication platform is conducive to the continuous promotion of partnerships and assists enterprises in effective tax planning. In the intelligent transportation PPP project in Guizhou Province, the project company uses the corporate premises through effective communication to promote the effective operation of the project without additional corporate tax burden. Enterprises and governments establish a normalized digital communication platform. In tax planning activities, under the premise of complying with the law, let relevant stakeholders assist in providing special VAT invoices, which can effectively reduce corporate costs. The digital communication platform makes the implementation of PPP projects and corporate tax planning more effective. The digital platform reduces unnecessary losses and costs in project operations, and helps to balance the fairness and efficiency of public service supply.

4.4 Big Data Monitoring to Balance Project Portfolio Investment

Big data monitoring technology improves the financial

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data analysis of PPP project companies. PPP projects have corresponding tax incentives at different stages. Big data monitoring enables tax incentives to be legally and compliant, and improves the effectiveness of corporate tax planning. Companies should make comprehensive use of big data monitoring results. PPP project companies have a reasonable asset-liability ratio and balanced portfolio investment, which will be more conducive to the increase of company value and reduce corporate tax burden. Big data monitoring technology provides an important guarantee for portfolio investment. The upgrade combination of transportation PPP projects and the original assets of the enterprise will bring advantages in tax planning. In terms of VAT, the combination of real estate development projects and PPP projects will bring a multiplier effect. Real estate projects generate a large amount of output tax, and the interest and indirect expenses of the real estate cannot obtain input, which can make up for the shortfall of the PPP project. In terms of corporate income tax, PPP projects are at a loss in the early stage of operation, and real estate projects have a fast turnover, which can solve the problem of mismatch between profit and loss time and projects in terms of corporate income tax.

4.5 Price Adjustment Mechanism to Deal with the Risk of Time Value

The core problem of the time value is that changes in time will lead to changes in the amount. In order to deal with the risk of the time value, a reasonable price adjustment mechanism can be formulated, and information based on big data can be provided to alleviate the impact of changes in the amount on tax planning. The construction and operation period of the intelligent transportation PPP project in Guizhou Province has a large span, and the big data generated during operation reflects the time value of money. The PPP model has a long cooperation period, and the consumer price index, labor market index, and project cost are constantly changing. In order to ensure the smooth progress of PPP projects, partners can effectively communicate based on big data changes, and adopt dynamic project price adjustment mechanisms to adapt to changes in the time value of money. The project uses the relevant costs in the first year as a benchmark and establishes a reasonable growth rate. In the process of project operation, refer to the indicators of the National Bureau of Statistics, combine with the big data of economic development, and adjust the original price appropriately to make the tax planning of PPP projects effective and applicable.

4.6 Improve the Digital Skills of Financial Personnel in PPP Projects

PPP project companies should make full use of preferential tax policies when making tax planning. In the context of the development of the digital economy, the combination of new infrastructure and PPP projects will have a direct impact on fiscal and taxation policies. When tax planning is involved in a PPP project, it must be adjusted in accordance with the current latest development trends and tax policies, which requires government and corporate staff to continuously improve their digital financial capabilities. Financial personnel with the ability to apply the digital economy are extremely important to the development of the project company. Financial personnel need to continuously improve their digital skills to respond to changes in policies and the digital economic environment. Tax planning requires continuous learning of digital financial knowledge and tax policies. Professional financial personnel use big data technology to legally and rationally conduct tax planning to maximize the company's value. PPP projects require high tax credit ratings, and the digital credit of corporate financial personnel is particularly important. The company combines incentives and supervision mechanisms, and through the big data credit platform, improves the quality of financial personnel and creates good internal conditions for tax planning of PPP projects.

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Analysis of the Impact of China's Novel Coronavirus Pneumonia on Chinese Enterprises' Performance

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ABSTRACT

The outbreak of novel coronavirus pneumonia has affected almost all industries and enterprises. This paper analyzes the impact of the epidemic on the macro economy through GDP and other indicators, analyzes the impact of the epidemic on the overall business performance of the enterprises through the asset turnover speed index of the above scale industrial enterprises, and analyzes the impact of the epidemic on the net profit of the listed companies through the first quarter performance forecast of the listed companies. At last, the paper puts forward that enterprises should improve their awareness and ability to resist risks.

1. Introduction

The novel coronavirus pneumonia, which was discovered by the Wuhan CDC in December 2019, is the most important public health event since the founding of the people's Republic of China, which has the fastest speed of transmission and the largest spread [1]. The state has taken a series of powerful measures to prevent and control the epidemic, such as blocking traffic, extending holidays and so on. With the joint efforts of the whole nation, the epidemic has been controlled, and the national production and living order has been gradually restored. Novel coronavirus pneumonia outbreak and prevention and control mainly concentrated in the first quarter of 2020. The series of measures adopted by the epidemic prevention have a great impact on the normal economic development. Based on the first quarter financial performance forecast released by listed companies, combined with some indicators reflecting macroeconomic indicators, the authors analyzed the impact of the new crown pneumonia epidemic on China's business performance.

2. Analysis of Novel Coronavirus Pneumonia Epidemic Situation Impact on the Macro Environment

On December 31, 2019, Wuhan health and Health Commission reminded the public to try to avoid going to public places where the air is not circulating and wear masks when going out; on January 23, 2020, the Ministry of transport informed Wuhan to close the airport, railway station and other channels, suspend the access to Wuhan road and waterway passenger transport lines, and do a good job in the health management of stations and other key places nationwide; on January 25, 2020, the Party Central Committee We began to promote local prevention and control work, strictly control traffic everywhere, and put into effect a series of

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measures, such as delaying the resumption of work by enterprises, delaying the opening of school, etc.; on February 23, 2020, the Party Central Committee proposed to restore the order of production and life in an orderly manner on the basis of grasping various epidemic prevention work [2]. According to the above timeline analysis, the impact of the epidemic on the external macro-economy of enterprises is mainly concentrated in January February 2020. Now, the GDP, production, consumption and investment indicators before and after the epidemic are summarized in Table 1.

Table 1. Comparison of macroeconomic indicators before and after the epidemic

Year and month	19.1-2	19.3	19.4	19.5	19.6	19.7	19.8
GDP growth	6.4%	6.4%	6.2%	6.2%	6.2%	6%	6%
Growth rate of industrial added value above Designated Size	5.3%	8.5%	5.4%	5%	6.3%	4.8%	4.4%
Growth rate of total retail sales	8.2%	8.7%	7.2%	8.6%	9.8%	7.6%	7.5%
Growth rate of fixed asset investment	6.1%	6.3%	6.1%	5.6%	5.8%	5.7%	5.5%
Year and month	19.9	19.10	19.11	19.12	20.1-2	20.3	--
GDP growth	6%	6%	6%	6%	-6.8%	-6.8%	--
Growth rate of added value of industries above Designated Size	5.8%	4.7%	6.2%	6.9%	-13.5%	-1.1%	--
Growth rate of total retail sales	7.8%	7.2%	8%	8%	-20.5%	-15.8%	--
Growth rate of fixed asset investment	5.4%	5.2%	5.2%	5.4%	-24.5%	-16.1%	--

Note: Data from the National Bureau of Statistics of the People's Republic of China.

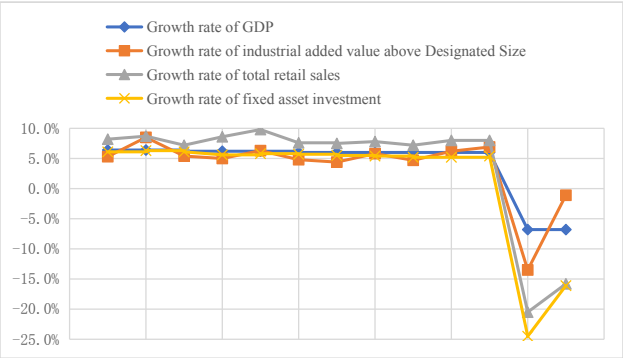

Figure 1. change trend of macroeconomic indicators before and after the epidemic

According to the data in Table 1 and the trend in Figure 1, before China novel coronavirus pneumonia outbreak, China's economic development was stable. The macroeconomic indicators showed a cliff breaking trend during the outbreak stage. The GDP and production, consumption and investment indicators fell sharply, especially fixed assets investment, which fell 24.5%. This shows that the epidemic situation has a significant impact on the external macroeconomic environment of enterprises. [3] After the epidemic was basically controlled at the end of February, the national policy changed from "comprehensive anti-epidemic" to "anti-epidemic + restart economy", and GDP, production, consumption, investment and other indicators began to rebound and rise, with a certain recovery [4].

3. Analysis of the Impact of Novel Coronavirus Pneumonia on Enterprise Performance

3.1 The Analysis of the Novel Coronavirus Pneumonia Impact on the Overall Business Indicators of Enterprises

The whole industrial chain operation of the enterprise will be affected by the strategies of blocking or strictly controlling the traffic and delaying the resumption of production. For example, the delay in the resumption of work by the enterprise itself will limit the production capacity and increase the labor cost; the delay in the resumption of work by upstream and downstream enterprises will delay the delivery of orders or products, or even fail to carry out normal operation; in addition, the traffic control will block the materials, which will greatly reduce the product turnover speed and payment collection speed of the enterprise [5]. Now, the indicators of accounts receivable and turnover period of finished products of Industrial Enterprises above Designated Size before and after the epidemic are summarized in Table 2.

Table 2. Comparison of overall business indicators of enterprises before and after the epidemic

Year and quarter	Quarter 1, 2019	Quarter 2, 2019	Quarter 3, 2019	Quarter 4, 2019	Quarter 1, 2020
Receivables turnover period of Industrial Enterprises above Designated Size	55.2days	54.9days	54.7days	54.7days	71.3days
Turnover period of finished products of Industrial Enterprises above Designated Size	18.1days	17.6days	17.2days	17.3days	26.1days

Note: the data is from data bank, which is calculated and collated.

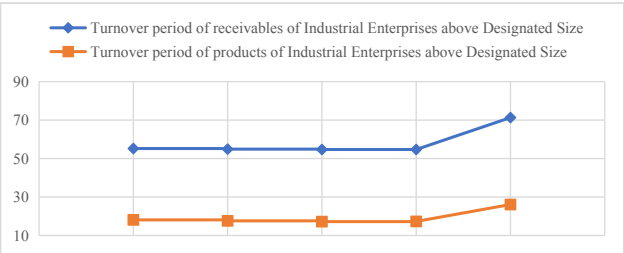

Figure 2. change trend of overall business indicators of enterprises before and after the epidemic

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According to the data in Table 2 and the trend in Figure 2, before the outbreak of novel coronavirus pneumonia, the average receivable turnover period and finished product turnover period of Industrial Enterprises above designated size were relatively stable. Two indicators showed a sharp trend during the outbreak stage, especially the accounts receivable turnover period was extended by nearly 30%. Traffic control and the delay of resumption of work in upstream and downstream enterprises will cause the following problems. First of all, there is no guarantee of sufficient supply of raw materials; second, employees do not return to work, and the production capacity is insufficient to produce enough products; finally, the market demand is insufficient, and the sales volume drops sharply, which will cause the company to extend the turnover period of finished products. In addition, the overall production and operation of the enterprise will need more cash flow support, but most enterprises will not hold a large amount of cash, which will affect the business credit between enterprises and greatly reduce the speed of payment collection [6].

3.2 Analysis of the Impact of Novel Coronavirus Pneumonia on the First Quarter Performance Forecast of Listed Companies

At the end of March and the beginning of April, the listed companies successively published the performance forecast of the first quarter of 2020. Through multiple screening, the author selected ten companies with large changes in net profit, and sorted out the median of the company's predicted net profit and the median of the net profit year-on-year growth rate, as shown in Table 3. From the perspective of management, we can see the impact of the epidemic on Chinese enterprises [7].

It can be seen from the data in the above table that the impact of the epidemic on Chinese enterprises is not so small. The above ten listed companies are all in profit in the first quarter of 2019. One epidemic directly turns profit into loss, and the loss range is huge. Among them, the first quarter loss of radio and television metering forecast is 90-130 million yuan, with the largest amount of loss in advance. The decrease of the company's income and profit is mainly due to the delay in the resumption of work and production of the company and its customers during the epidemic period, traffic restrictions and other factors, resulting in the postponement of customer orders. Meanwhile, during the epidemic period, the cost of employee compensation, house rental, asset depreciation and other costs increased compared with the same period last year. With the novel coronavirus epidemic gradually controlled, the whole country has accelerated the resumption of production and resumption of production, and the company's business and orders have gradually returned to normal, and the company's market operation will continue to improve [8]. The above companies are all listed companies, with relatively strong anti-risk ability. The situation of unlisted SMEs should be more difficult.

Table 3. Statistics of the first quarter performance forecast of the listed companies with the largest impact of the epidemic in 2020

Code	Company name	Industry	Median forecast net profit for the first quarter	Compared with the median	Reasons
002350	CRERT	Transmission electric	-4500Ten thousand yuan	-731%	Delayed return to work due to epidemic
300011	DIN HAN	Delivery equipment	-3450Ten thousand yuan	-564%	The epidemic led to a drop in orders
300721	Yida shares	Chemical industry	-1050Ten thousand yuan	-549%	The epidemic makes it difficult to operate
300358	Truking Technology	Medical industry	-2550Ten thousand yuan	-500%	The epidemic reduced income
300793	Jiahe intelligence	Electronic component	-740Ten thousand yuan	-486%	Delayed return to work due to epidemic
002658	Sheraton	Instruments and Apparatuses	-31.50Ten thousand yuan	-418%	Delayed return to work due to epidemic
002922	Igor	Transmission electric	-480Ten thousand yuan	-348%	The epidemic reduced income
002364	Yueqing City Heng Electric	Transmission electric	-2700Ten thousand yuan	-337%	Delayed return to work due to epidemic
002902	Mentech	Electronic component	-1600Ten thousand yuan	-271%	Delayed return to work due to epidemic
002967	Radio and television metering	Comprehensive industry	-11000Ten thousand yuan	-237%	Orders delayed due to epidemic

Note: the data comes from the first quarter performance forecast of each company.

4. Conclusion

According to the previous analysis, a sudden outbreak of novel coronavirus pneumonia has a great negative impact on the external macroeconomic environment and the production and operation of enterprises. This is also a wake-up call to the operators of enterprises. Because the environment of enterprises is constantly changing, and even some disasters are beyond our reasonable expectation. Therefore, an enterprise must pay more attention to the operational risk and financial risk, do a good job in

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risk early warning and prevention and control mechanism, control the overall risk of the enterprise within the safe range, and be able to withstand the attack of external risk, so as to have the sustainability of development [9].

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The Status Quo, Dilemma and Path Innovation of the Citizenization of the New Generation of Migrant Workers

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ABSTRACT

The citizenization of the new generation of migrant workers is the only way to promote China's urbanization. Based on the development status of the new generation of migrant workers, this paper summarizes the difficulties encountered in the four aspects of employment, housing, social security and the education of migrant workers' children in the process of citizenization, finally explores four innovative ways of citizenization of the new generation of migrant workers, such as, strengthening vocational skills training to improve the employment quality of the new generation of migrant workers, improving the housing security mechanism to ensure that they have a place to live, improving the social security system to safeguard that they can be treated for their illnesses and the elderly, improving the distribution of educational resources to promote fair education for the children of them.

1. Introduction

Since the founding of New China more than 70 years ago, the process of urbanization in China has continued to advance, and urban-rural integration has been developing continuously. As we all know, urbanization is the inevitability of historical development, and taking a new urbanization road of urban-rural integration is the key to solving the plight of rural development, which is conducive to promoting the implementation of rural revitalization strategy. The new generation of migrant workers as a new group of urban-rural integration and stable development, they are the main force in the construction of new urbanization. The citizenization of the new generation of migrant workers is conducive to promoting the development of China's urban-rural integration, improving the rational allocation of urban and rural resources, alleviating the imbalance between urban and rural development, and promoting urban and rural economic, social and cultural development. Thus, it is of great significance to protect the legitimate rights and interests of farmers and increase their income.

2. Literature Review

2.1 Research on the New Generation of Migrant Workers

In the development process of urban-rural integration in China, a large number of farmers leave the countryside and land, which plays an important role in the construction of urbanization. Compared with the first generation of migrant workers, the new generation of migrant workers mainly refers to those who were born after the 1980s and have rural household registration but working in cities.

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They generally receive higher education, have a wide range of employment and high job expectations. Today, the new generation of migrant workers have become the main force in the integrated development of urban and rural areas in China. With regard to the research on the new generation of migrant workers, Chinese scholars express their own views, mainly focusing on employment, housing, social security, children's education and identity and so on. For example, Dong Hongli (2020) pointed out the current employment situation and the existing employment problems of the new generation of farmers, put forward targeted suggestions to solve the employment problem [1]. Zhu Zhongkun (2020) based on Survey on Dynamic Monitoring of Floating Population in China in 2017, used the probit model to explore the impact of housing on the willingness of the new generation of migrant workers to stay in the city, and found that indemnificatory housing has a positive effect on the willingness to stay in the city [2]. Xiao Jianyi (2020) explored the social security of the new generation of migrant workers in China, and pointed out that there are many problems in the social security of migrant workers in China, such as difficultly in payment, difficulty in use, strict payment requirements, few insurance items, lack of work-related injury insurance and more restrictions on unemployment insurance and so on [3]. Based on the survey data of seven schools for the children of migrant workers in Guangzhou, Zhou Liping and Yu Zilin (2019) found that there are some problems in the education of migrant workers' children, such as low financial allocation, high burden on migrant workers and regional unfairness [4]. Xu Yanhui and Qiu Xiao (2019) found that they have a low urban identity when studying the impact of social and economic security on the identity of the new generation of migrant workers [5].

2.2 Research on Citizenization of the New Generation of Migrant Workers

The citizenization of migrant workers has always been a hot topic in all walks of life in China._In terms of government documents, the issue of social integration of the new generation of migrant workers was put forward for the first time in the No.1 central document in 2010. 'The National New Urbanization Plan (2014-2020)', released in 2014, aims to solve the problem of citizenization of the new generation of migrant workers in China. Later, the report of the 19th National Congress of the Communist Party of China (CPC) and the No.1 Document of the Central Committee for several consecutive years repeatedly proposed to accelerate the process of citizenization of China's agricultural transfer population. In terms of academic articles, the earliest article on this topic was published in 2005, followed by an endless stream of related articles, mainly focused on the factors affecting the willingness to citizenization and the path exploration of citizenization in China. For example, based on the survey data of 978 new generation migrant workers in Jiangsu and Anhui in China, Yu Lin, Yin Jianbing, etc. (2019) used Structural Equation Model to make an empirical conclusion that improving the value perception of migrant workers can promote the process of citizenization [6]. Yan Xiaolei (2020) explored the path innovation of the rule of law of the new generation of migrant workers, analyzed the causes of the existing legal problems, and put forward suggestions on strengthening legal education, improving the construction system of the rule of law and protecting the legitimate rights and interests of migrant workers [7].

The year 2020 is the final year in China to build a moderately prosperous society in all respects, and the construction of urbanization is still non-stopping. The 'Key Tasks for New Urbanization and Urban-Rural Integration Development in 2020' announced in April this year clearly pointed out that it is necessary to improve the quality of citizenization and accelerate the development of urban-rural integration, but at present, there is still a long way to go to solve the problem of citizenization of the new generation of migrant workers in China. In order to fully understand the citizenization of the new generation of migrant workers in China, this paper, based on the current situation of citizenization, analyzes the current plight of it, so as to explore the path innovation of citizenization and provide suggestions for the citizenization of the new generation of migrant workers.

3. Current Situation and Dilemma

The issue of social integration of the new generation of migrant workers was mentioned for the first time in the No.1 central document in 2010. From 2010 to 2019, the urbanization rate of permanent population and registered population have been increasing. The difference between the urbanization rate of the permanent population and the urbanization rate of the registered population rose from 16.56% in 2011 to 19.07% in 2013, and then dropped to 16.2% in 2015. In the following four years, the difference between the two fluctuated around 16.2%. In 2019, China's urbanization rate exceeded 60% for the first time, but 227 million people were in the current situation of 'Separation between Household Registered and Actual Residences'. As shown in Table 1. A large number of 'Separation between Household Registered and Actual Residences' increases the difficulty of population management and affects social stability.

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Table 1. Urbanization Rate of Permanent Population and Registered Population from 2010 to 2019 (unit:%)

Index/Year	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Permanent Population	60.60	59.58	58.52	57.35	56.10	56.10	54.77	53.73	51.27	49.7
Registered Population	44.38	43.37	42.35	41.2	39.90	37.10	35.70	35	34.71	-
difference	16.22	16.21	16.17	16.15	16.2	18.4	19.07	18.73	16.56	-

Data Source: National Bureau of Statistics

Although the new generation of migrant workers have more advantages than the first generation of migrant workers, they are still limited by degree, skills and social networks, etc, with low income, and low sense of identity. There are still many problems in employment, housing, social security and children's education, which make it difficult for them to integrate into urban life. Besides, the 'Dualization of household registration' makes it more difficult for them to become urban citizens. The biggest obstacle to the citizenization of migrant workers in China is the 'Dualization of Household Registration'. In fact, the fundamental reason is the cost of citizenization [8]. In the process of migrant workers becoming citizens, the social management costs, medical care, education, pension, housing and other social security, as well as urban infrastructure construction costs, whether these costs can be burdened, who will bear, how to bear are the problems we have to face at present. Generally speaking, the citizenization of the new generation of migrant workers in China is more serious.

3.1 The Employment Dilemma of the New Generation of Migrant Workers

Although the new generation of migrant workers have received higher education, a wider range of employment and higher job expectations than the first generation, in reality, there are still many problems in the employment of them.

First, the quality of employment is not high. According to the data, the new generation of migrant workers are mainly engaged in manual labor, such as manufacturing and construction, due to their junior qualifications and insufficient professional skills, with poor working conditions, long working hours, high labor intensity and high danger, beside, their the quality of employment is generally not high.

Second, double discrimination in employment and wages. Migrant workers are the main force of dirty, chaotic and poor jobs in cities. High-intensity work is not matched with low income, and 'different salaries for the same job' is the norm. Moreover, migrant workers are also the main target group for enterprises or employees to delay and deduct wages, which makes it difficult for migrant workers to have a guaranteed income [9].

Third, employment quality is divorced from the market demand. With the development of China's economy, the progress of science and technology, and the upgrading of industrial structure, the demand for labor in China is not only satisfied with the quantity. Now the demand for high-quality talents is strong, but the supply of technical talents is in short supply. If the new generation of migrant workers don't improve their professional quality and carry out relevant vocational training, it will become more difficult to work in cities.

3.2 The Housing Dilemma of the New Generation of Migrant Workers

Housing has always been the common aspiration of the Chinese people, and housing is the basic guarantee for migrant workers to stay in cities. Compared with the first generation of migrant workers, the new generation of migrant workers have less dependence on rural land, and those who work in cities have a stronger willingness to buy houses in cities. However, China's urban housing prices remain high, making many urban residents become mortgage slaves, which is even more difficult for the new generation of migrant workers. At present, there are two problems in the housing of the new generation of migrant workers in China.

First, the living environment is poor. Most of the new generation of migrant workers mainly live in factory dormitories and workplaces or sheds, and some rent houses independently or share with others. These living areas are small, many supporting facilities are not complete, and the environment is very bad.

Second, they lack housing security. The current housing policy has a serious impact on migrant workers settling in cities, and the current situation of high housing prices and low income also makes it difficult for them to buy a house. Some can't even afford to rent a house, and some have no residence in the city. They spend a lot of time and energy commuting between home and work every day. In short, the new generation of migrant workers' urban housing supply is insufficient, the rental market is not perfect and the urban housing security is lacking.

3.3 The Social Security Dilemma of the New Generation of Migrant Workers

The 17th National Congress of the Communist Party of China (CPC) put forward the principle of 'people should have access to education, employment, medical care, old-

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age care and housing', and continuously improved China's social security system. At present, the social security of the new generation of migrant workers in China has the following three dilemmas.

First, the social insurance coverage of the new generation of migrant workers is relatively narrow.

As shown in Table 2, this paper mainly chooses three kinds of social insurance: basic old-age insurance for urban workers, industrial injury insurance and unemployment insurance. As we can see from the table, the participation rate of basic old-age insurance for urban workers of migrant workers has been declining year by year, while the participation rate of industrial injury insurance has been fluctuating with a very small increase. The number of migrant workers participating in these two insurance has been increasing every year. The unemployment insurance participation rate has increased slightly for three consecutive years, but it declined in 2018, and the number of migrant workers participating in the insurance also decreased. On the whole, migrant workers have not been fully integrated into the urban social security system, the participation rate of migrant workers is very low, and the highest rate of work-related injury insurance, only about 33%, which is far lower than that of urban workers.

Second, the social insurance program of the new generation of migrant workers is not perfect. On the one hand, due to the lack of access to information, the awareness of migrant workers to participate in insurance is weak, on the other hand, due to the low income and the excessively high social insurance contribution rate, many migrant workers only participated in the basic insurance, New Rural Cooperative Medical Insurance and New Rural Social Endowment Insurance. If they get hurt at work, it often leads them back to poverty.

Third, the social welfare of the new generation of migrant workers is not balanced and social assistance is insufficient. Migrant workers enjoy social welfare such as community service and education, which is quite different from urban residents. Migrant workers have strong mobility and rarely sign written labor contracts with their work units, and have weak awareness of safeguarding their rights, which makes it difficult for them to obtain legal protection. The psychological problems of migrant workers are also easy to be ignored. Due to lack of steady work, their living environment and workplace often change, and their living habits and lifestyles need to be constantly changed and adapted. Psychological assistance is needed for psychological problems such as identity, but this aspect is currently lacking.

Table 2. The Number and Rate of Migrant Workers Participating in Three Kinds of Insurance from 2015 to 2019

Kind	Urban Employee Insurance			Employment Injury Insurance			Unemployment Insurance		
Year	Number	Migrant Workers	Rate	Number	Migrant Workers	Rate	Number	Migrant workers	Rate
2019	43488	-	-	25478	8616	0.3382	20543	-	-
2018	41902	6221	0.1485	23874	8085	0.3387	19643	4853	0.2471
2017	40293	6202	0.1539	22724	7807	0.3436	18784	4897	0.2607
2016	37930	5940	0.1566	21889	7510	0.3431	18089	4659	0.2576
2015	35361	5585	0.1579	21432	7489	0.3494	17326	4219	0.2435

Data source: According to the official website of the Ministry of Human Resources and Social Security

3.4 The Educational Dilemma of the Children of the New Generation of Migrant Workers

In 2004, the No.1 document of the Central Committee proposed that 'the education of the children of migrant workers in cities should be included in the financial budget to solve the problem of their children's enrollment'. Nowadays, children's education has become an important factor affecting the citizenization of the new generation of migrant workers. The education of the children of the new generation of migrant workers in China has the following problems.

First, it is difficult for urban public schools to satisfy the education of migrant workers' children. On the one hand, in order to prevent children from becoming left-behind children, on the other hand, they can enjoy better educational resources in the city, a large number of migrant workers put their children in public schools in their cities after they work in cities. However, the urban education resources are limited, which mainly meet the needs of urban registered permanent residence students. Even if their children are allowed to attend school, they need to return to their registered permanent residence to take the key exams, so they cannot enjoy urban policies, resulting in educational injustice. For those who cannot go to public schools, some of their children go to private schools, and the high cost of education increases the burden on migrant workers.

Second, the specially established schools for migrant workers' children have weak teachers. Some cities specially set up schools for migrant workers' children, but such schools have poor teaching quality, low level of teachers, imperfect equipment, chaotic internal management, and access to unequal educational resources with urban children, which gradually expand the quality of education of urban children and migrant workers' children.

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4. Path Innovation

4.1 Strengthen Vocational Skills Training and Improve the Employment Quality

'Only when people have a permanent career can they have perseverance'. Employment is the foundation of people's livelihood and an important guarantee of social stability. With the rapid development of urban economy, culture and society, the requirements for practitioners in all walks of life in China are constantly improving. In order to better adapt to the development of modernization, the new generation of migrant workers should constantly improve their special technical level, strengthen vocational skills training, enhance their competitiveness, and better integrate into the city. The government should strengthen employment guidance and skills training for the new generation of migrant workers, encourage migrant workers to start their own business, set up entrepreneurship and training funds, and provide a platform for them to exchange, learn and promote together. In short, we should not only improve the professional skills of the new generation of migrant workers, but also pay attention to improving their professionalism, enhance comprehensive quality. As the saying goes, 'A man can stand without integrity'.Let the new generation of migrant workers have a stable job and a stable income in the city, so as to promote the citizenization process.

4.2 Improve the Housing Security Mechanism and Make Sure Them Have a Place to Live

As a proverb says, 'To live and work in peace and contentment'. Housing is the key to promoting the citizenization of the new generation of migrant workers. First, improve the household registration system. China's 'dual urban and rural household registration system' makes it difficult for migrant workers and urban residents to enjoy equal housing, education and social security. The government should explore a new household registration system to break the household registration barriers for migrant workers to become citizens. China will create an equal social environment and lower the threshold for the new generation of migrant workers to enter the cities with household registration. Second, in terms of housing, on the one hand, the government should improve the living environment of the new generation of migrant workers, improve infrastructure, strengthen housing management, and also provide rent subsidies or cheap public rental housing and so on. On the other hand, we will improve the housing security mechanism, formulate purchase subsidy policies, and integrate migrant workers into the urban housing security system, so that they can afford to buy urban housing and live in urban housing. Third, vigorously develop the rental market. The housing prices in China's cities remain high, many urban residents are trapped in the plight of buying a house. At present, and renting houses has a great market prospect. We should actively explore innovative ways and types of renting houses so that renters and buyers can enjoy the same experience. In short, the continuous improvement of China's housing security mechanism to ensure that the new generation of migrant workers have a place to live, which also plays a positive role in promoting the citizenization of migrant workers.

4.3 Improve the Social Security System and Have Access to Medical Care and Security for the Elderly

Social security includes social insurance, social assistance, social welfare and social preferential treatment, which is a cause that benefits people's livelihood. First of all, we should strengthen the publicity and education of the social security system and enhance the awareness of the new generation of migrant workers to participate in the insurance, so as to improve the payment rate of social insurance and expand the coverage of social security. Secondly, the relevant departments should strengthen the supervision of social security, regularly check the income and expenditure, operation and management of social security, so as to avoid unfair treatment of their rights and interests. Besides government should formulate laws and regulations on social security, improve the social security system, and avoid institutional loopholes. Finally, we should pay more attention to the social assistance of the new generation of migrant workers, including psychological assistance. Due to the unstable work, they often change their living environment and workplace, which makes their living habits and lifestyles constantly change and adapt. Research shows 'The higher the new generation of migrant workers have a sense of urban identity, the more they tend to be citizens'.

4.4 Improve the Allocation of Educational Resources and Promote Educational Equity

At the 19th National Congress of the Communist Party of China (CPC), General Secretary Xi Jinping said that 'we should carry out the fundamental task of cultivating people by virtue, develop quality-oriented education and promote educational fairness'. The education of the children of the new generation of migrant workers needs efforts from all aspects. First, the family is the child's first school, and parents are the key to the success of a child's 'first

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lesson in life', just like the saying goes, 'button up the first button in life'. Second, schools should pay attention to the physical and mental development of students, avoid by all means the only achievement theory, only ranking theory. At the same time, school should cultivate students to set up correct values, create a friendly and inclusive atmosphere, teachers should pay attention to students' mental health, and cultivate students' self-confidence, let them learn to respect each other, eliminate prejudices and treat others equally. Third, the government rationally allocates educational resources and arranges the education of children living with migrant children, so that migrant workers' children and urban children can enjoy the same quality of education equally, and at the same time pay attention to the physical and mental growth of left-behind children in rural areas. The central government and local governments have made clear their responsibilities and increased financial support for the compulsory education of children of migrant workers to ensure their compulsory education. Fourth, society should learn to accommodate migrant workers, without discrimination, ridicule or prejudice, all people are created equal and learn to respect each other. We will achieve a fair education for the children of migrant workers, solve the worries of the new generation of migrant workers, and accelerate the process of citizenization of migrant workers.

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Three Methods to Calculate the Financial Risk Measurement: Value-At-Risk and Expected Shortfall

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ABSTRACT

This paper analyzes the relationship between the risk factor of each stock and the portfolio's risk based on a small portfolio with four U.S. stocks, and the reason why these risk factors can be regarded as a market invariant. Then, it evaluates the properties of the convex and coherent risk indicators of the capital requirement index composed of VaR and ES, and use three methods(the historical estimation method, boudoukh's mixed method and Monte Carlo method) to estimate the risk measurement indicators VaR and ES respectively based on the assumption of multivariate normal distribution' risk factors and multivariate student t-copula distribution's one, finally it figures out that these three calculation results are very close.

1. Exploratory Analysis of Risk Factors

Section 1 gives a basic description of statistical properties of risk factors Xi for all four assets and an explanation of how log-returns reflect the riskiness of both individual asset and the whole portfolio. And it presents reasons why risk factors are market invariants based on the method originated by Attilio Meucci[1].

From table 1, we can verify clearly that the average log-returns of stock 1 and stock 2 are negative, whereas stock 3 and 4 have positive average risk factors, which means the return of asset 1 and asset 2 have lower averaging benefits[4].

Table 1. Mean, Variance, Min, Max, Quartiles of 4 Risk Factors

Risk factors	X1	X2	X3	X4
Mean	-8.493145e-05	-8.935721e-05	8.845965e-05	8.474993e-05
Variance	0.0003200096	0.0002307729	0.0002749404	0.0007659206
Minimum	-0.1155822	-0.150271	-0.180606	-0.2876821
Maximum	0.1572141	0.1586307	0.1325256	0.2586502
1st quartile	-0.0082076046	-0.0068018315	-0.007854612	-0.01035043
2nd quartile	0.0005981756	-0.0001143053	0.000000000	0.00000000
3rd quartile	0.0084305330	0.0068594796	0.008084315	0.01040593

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For variances, the smallest is for stock 2 and the largest is for stock 4. They indicate that the second stock is the most stable one during this period but the fourth oscillates more frequently and represents high riskiness. Stock 4 is the riskiest one among these four assets. The more proportion of stock 4 results in riskier portfolio.

The maximal log return (0.2586502) is for stock 4. It is apparently higher than those of other three assets. From the combination of the maximum and minimum of stock 4, we can realize that it is the riskiest one as well. Since stock 4 occupies 46.67% of the whole portfolio, the fluctuations of asset 4 connect to the riskiness of portfolio closely.

Table 2. Covariances between risk factors

Covariance	X1	X2	X3	X4
X1	0.0003200096	0.0002054446	0.0001573925	0.0001872091
X2	0.0002054446	0.0002307729	0.0001374079	0.0001568926
X3	0.0001573925	0.0001374079	0.0002749404	0.0001914346
X4	0.0001872091	0.0001568926	0.0001914346	0.0007659206

From table 2, we can see that all covariances are positive. It means that when one log return increases, other three will increase as well. All four stocks show the same trend of riskiness changes. And X1 is more correlated to X2. The connection between X3 and X4 is closer. For the whole portfolio, the riskiness changes with same direction of risk factor changes.

Modelling the stock market requires there to be a repetitive statistical behavior, such that the stock prices are independent and identically distributed (i.i.d) over time, this is called in market invariants. If the log-returns of the stocks, Xi for i = 1,2,3,4, are market invariant then it implies that any shocks to the market will be short-term and the readjust to market behavior over time. Also, it allows predictions to be made about future outcomes with a certain confidence level. According to Meucci[1] (2005) there are two simple graphical tests we can use detect invariance in our time series. In the first test, we divide the time series Xi into two separate series, then we plot histograms of the two series. If Xi is market invariant then the histogram of the 1st half-sample should resemble the histogram of the 2nd half-sample as shown in figure 1.

The second test for invariance does not require splitting the data but rather plotting the entire time series against its lagged values. If is market invariant then the scatter plots for i = 1,2,3,4 should resemble a circular cloud (Meucci[1], 2005). In figure 2 we see that this is the case.

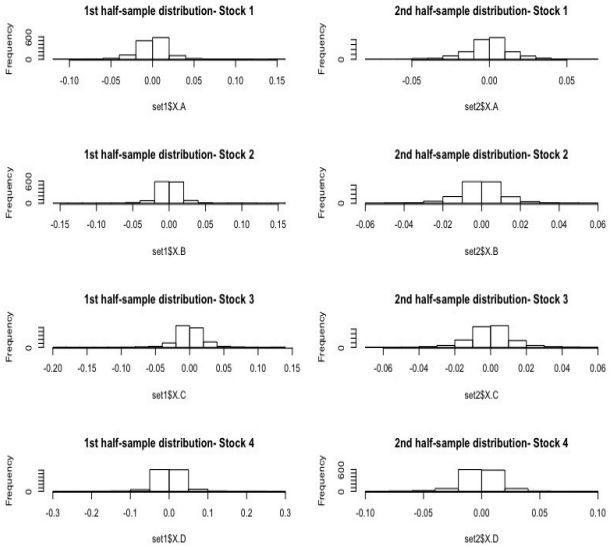

Figure 1. Stock Logarithmic Returns

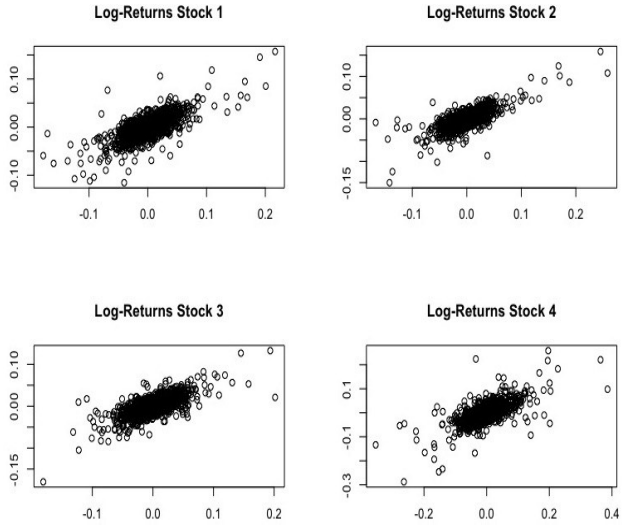

Figure 2. Scatter plot with lags of log-returns for Stocks: 1, 2, 3, 4

Figure 2: Testing for Normality: In theory, total returns are assumed to be log-normally distributed, therefore, if that is true then we can also assume that the log-returns, Xi follows a normal distribution (Meucci, 2005). We can check if Xi is normally distributed by using a normal Q-Q plot which plots the standardized empirical quantiles of the observed data against the quantile of a standard normal random variable. Normality on a Q-Q plot is represented by a dense scatter of points at 45◦ around the line of best fit. In figure 3 we can see that our Q-Q plots show a tight variability around the middle of the data but there are great deviation on the tail ends. Under regular circumstances these Q-Q plots would allow us to reject the assumption of

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normality but in this case the greater variability at the tail ends of the points is caused by volatility clustering, which means that volatility is higher in some periods such as the 2008 financial crisis. To confirm whether or not our log-returns Xi follow normally distributed, we can use the Jarque-Bera normality test which determines if Xi have the skewness and kurtosis that matches a normal distribution. The test yielded a p-value < 2.2 × 10−16 for each log-returns, therefore we cannot assume Xi to be normally distributed.

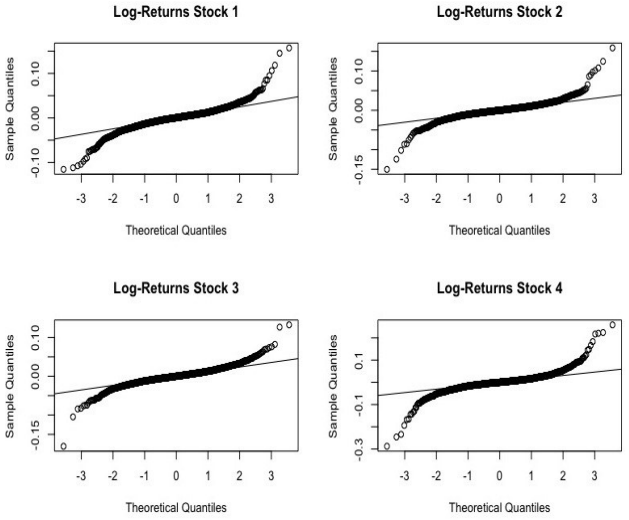

Figure 3. Normal Q-Q plots of log-returns for Stocks: 1, 2, 3,4

2. Estimating Value at Risk & Expected Shortfall Using Historical-Estimation Method

In this section, we apply the historical-estimation method and hybrid method in the paper by Boudoukh et al (1998) in section 2 to calculate the value at risk (VaR) and expected shortfall (ES) at the confidence level 99.9%.[2]

Value at Risk (VaR) and Expected Shortfall (ES) are commonly used risk measures in analyzing market risk. VaR and ES both measures the potential loss of our portfolio over a period of time for a given confidence interval. VaR is the worse-case loss of our portfolio over a period of time, whereas ES is the average loss that occur after the worse-case VaR threshold. It could also be used in calculating the minimal capital requirement that our investment fund is required to hold to have protection against the risks we are taking on.

In this part we will take a look at computing VaR and ES using the historical-estimation method. This method uses historical data for Xi and an estimate for the probability distribution of the loss based on the empirical distribution. There are no assumptions on the probability distribution of Xi made, hence it is robust to non-normality and does not affect the results. For a confidence level α = 99%, we can compute the $VaR_{0.99}(L)$ and $ES_{0.99}(L)$ for the portfolio loss using historical estimation method in the following steps:

(1) At time t, collect the historical dataset $(X^i_{t-(n+1)\Delta,}\ldots,X^i_{t-2\Delta,}X^i_{t-\Delta,}X^i_t)$, for i =1,2,3,4 and where n = 2716 for this portfolio sample size and Δ = 1 day is the fixed distance between two consecutive time instants.

(2) Now use the historical estimation method to compute portfolio loss in terms of the Xi using the following formula:

$$L_{t+1} = -\Big(\sum_{i=1}^{4} \phi^i_t \cdot S^i_t(e^{X^i_{t+1}} - 1)\Big)$$

Which results in a dataset of losses: $\widetilde{L_t} = l_{[t]}\,(X^i_{t-(n+1)})$, where $l_{[t]}$ is the loss operator at time t. It is assumed that the losses during the different time periods are (i.i.d).

(3) Sort the absolute value of the losses in ascending order such that $\tilde{L}_{n,n} \leq \ldots \leq \tilde{L}_{1,n}$.

(4) Now, the $VaR_{0.99}(L)$ and $ES_{0.99}(L)$ can be computed using:

$$\widehat{VaR}_{0.99}(L) = q_L(0.99) = \tilde{L}_{[2716(1-0.99)]+1,2716} = \$84,785$$
$$\widehat{ES}_{0.99}(L) = \frac{\sum_{i=1}^{[2716(1-0.99)]+1} \tilde{L}_{i,n}}{[2716(1-0.99)]+1} = \$122,667.80$$

For VaR this means that our worst-case loss of our portfolio over 1 day is $84,785 with a 99% confidence level. If VaR is exceeded then the maximum expected loss for the portfolio is $122,667.80 with a 99% confidence level.

The other new method, which is called hybrid method in the paper by Boudoukh et al. (1998) [5], combines two approaches to VaR estimation: Risk Metrics[6] and historical estimation method, and hence hybrid method is partly alike historical estimation method. Just like the historical estimation method, the new method firstly orders the returns over a certain period from lowest to highest. Difference between two methods is that hybrid method assigns exponentially declining weights to historical returns while historical estimation method gives equal weights to each observed return. Meaning behind the new attributing method is that recent data have more impact on computing latest values of risk measures. Because of the different way of attributing weights, obtaining VaR at a certain significance level using same returns involves different number of observations for two methods. The exact number is

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up to how recently the extreme low returns are observed. What's more, historical estimation method does not consider linear interpolation usually while hybrid approach does.

Since the hybrid approach combines historical estimation method and exponential smoothing method, it inherits their advantages. Like historical estimation, hybrid method does not take assumptions before being used. Like exponential smoothing, the new approach uses exponential declining weights on past data, allowing users to capture the cyclical movement of return volatility and assigning more power to recent data, which is more realistic. It is worth mentioning that some empirical results presented that the new method provides an absolute error which is much lower than that of historical estimation approach and of exponential smoothing approach. Additionally, in the paper by Boudoukh et al. (1998), the author did a test and the results showed that the new method offers the lowest level of autocorrelation between assets and parameters among the three approaches. A very important advantage is that hybrid method provides improvements on the basis of historical estimation and exponential smoothing methods without increasing computational complexity, data intensity and programming difficulty.

The role of λ: In computation of time weights, λ is actually a decay factor. In the initial step of hybrid method, we denote l_t as the realized loss from t-1 to t. For each of the most recent K losses, l_t, l_{t-1},...,$l_{t-(K-1)}$we assign the weights:

$$\frac{1-\lambda}{1-\lambda^K}, \frac{1-\lambda}{1-\lambda^K}\cdot\lambda, ..., \frac{1-\lambda}{1-\lambda^K}\cdot\lambda^{K-1}$$

Where $\lambda \in (0,1)$ is fixed. As we can see, when λ gets larger in interval (0,1), the weights given to data observed further in the past will be smaller while that assigned to more recent data will be greater. That means returns observed recently have more power to affect the risk measurement.

We choose λ = 0.98 when implementing the algorithm. The reason is that Boudoukh et al. (1998) fixed λ to be 0.98 when he gave an example for how to use hybrid method. Besides, figure 4 shows that decay factors for equity indices across different countries are close to 0.98 and because stocks are close to equity indices to some extent, we take equity indices as representative here. And When we take 99% as the value of the confidence level α, and let λ = 0.98, the results of $VaR_{0.99}(L)$ and $ES_{0.99}(L)$ are $57,863.65 and $66,129.70 respectively.

Optimal decay factors based on volatility forecasts
based on RMSE criterion

Country	Foreign exchange	5-year swaps	10-year zero prices	Equity indices	1-year money market rates
Austria	0.945	—	—	—	—
Australia	0.980	0.955	0.975	0.975	0.970
Belgium	0.945	0.935	0.935	0.965	0.850
Canada	0.960	0.965	0.960	—	0.990
Switzerland	0.955	0.835	—	0.970	0.980
Germany	0.955	0.940	0.960	0.980	0.970
Denmark	0.950	0.905	0.920	0.985	0.850
Spain	0.920	0.925	0.935	0.980	0.945
France	0.955	0.945	0.945	0.985	—
Finland	0.995	—	—	—	0.960
Great Britain	0.960	0.950	0.960	0.975	0.990
Hong Kong	0.980	—	—	—	—
Ireland	0.990	—	0.925	—	—
Italy	0.940	0.960	0.935	0.970	0.990
Japan	0.965	0.965	0.950	0.955	0.985
Netherlands	0.960	0.945	0.950	0.975	0.970
Norway	0.975	—	—	—	—
New Zealand	0.975	0.980	—	—	—
Portugal	0.940	—	—	—	0.895
Sweden	0.985	—	0.980	—	0.885
Singapore	0.950	0.935	—	—	—
United States	—	0.970	0.980	0.980	0.965
ECU	—	0.950	—	—	—

Figure 4. Optimal decay factors based on volatility forecasts (Risk Metrics technology document by JP Morgan, 1996)

3. The Capital Requirement of the Portfolio

We consider using formulas $C = \beta * VaR_{0.99} + (1-\beta)ES_{0.99}$ to calculate the capital requirement of the portfolio, then we identify whether the capital requirement C is a risk measure or not and shows its properties (For simplicity, let β=0.3)[7] [8].

3.1 Monotonicity

The capital requirement C is a Risk measure. Let L1 and L2 be two random variables, we can get that:

$$C(L^1) = 0.3V\ aR_{0.99}(L^1) + 0.7ES_{0.99}(L^1)$$

$$C(L^2) = 0.3V\ aR_{0.99}(L^2) + 0.7ES_{0.99}(L^2)$$

We know that VaR_α and ES_α are risk measure, which means they satisfied with monotonicity. Thus if $L1 \le L2$, it is easy to know:

$$0.3V\ aR_{0.99}(L1) + 0.7ES_{0.99}(L1) \le 0.3VaR_{0.99}(L2) + 0.7ES_{0.99}(L2)$$

$$C(L^1) \le C(L^2)$$

Thus the capital requirement C satisfies Monotonicity, and the capital requirement C is a Risk measure.

3.2 Translation Invariance

The capital requirement C is a Monetary Risk measure. Let L be a random variable, fix $m \in R$, we can get

$$C(L + m) = 0.3V\ aR_{0.99}(L + m) + 0.7ES_{0.99}(L + m)$$

As we know, VaRα and ESα are translation invariance, so:

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$$C(L + m) = 0.3V\,aR_{0.99}(L + m) + 0.7ES_{0.99}(L + m)$$

$$= 0.3(V\,aR_{0.99}(L) + m) + 0.7(ES_{0.99}(L) + m)$$

$$= 0.3V\,aR_{0.99}(L) + 0.3m + 0.7ES_{0.99}(L) + 0.7m$$

$$= 0.3V\,aR_{0.99}(L) + 0.7ES_{0.99}(L) + m$$

$$= C(L) + m$$

Thus the capital requirement C satisfies Translation invariance, and the capital requirement C is a Monetary Risk measure.

3.3 Convex risk Measure

The capital requirement C is not a Convex risk measure. Let L^1 and L^2 be two random variables, fix $\lambda \in R$, we can get:

$$C(\lambda L^1 + (1 - \lambda)L^2) = 0.3VaR_{0.99}(\lambda L^1 + (1 - \lambda)L^2) + 0.7ES_{0.99}(\lambda L^1 + (1 - \lambda)L^2).$$

As we know, ESα satisfies Convexity but V aRα not. Thus we cannot get $C(\lambda L^1 + (1 - \lambda)L^2) \leq \lambda C(L^1) + (1 - \lambda) C(L^2)$, the capital requirement C does not satisfy Convexity, and the capital requirement C is not a Convex risk measure.

3.4 Coherent risk Measure

The capital requirement C is not a Coherent risk measure, but it statisfies positively homogeneous. Let L be a random variable, fix $c \in (0,+\infty)$, we can get:

$$C(cL) = 0.3V\,aR_{0.99}(cL) + 0.7ES_{0.99}(cL)$$

As we know, V aRα and ESα are both Positive Homogeneity, so:

$$C(cL) = 0.3V\,aR_{0.99}(cL) + 0.7ES_{0.99}(cL)$$

$$= 0.3cV\,aR_{0.99}(L) + 0.7cES_{0.99}(L)$$

$$= cC(L),$$

thus the capital requirement C satisfies Positive Homogeneity. But as the capital requirement C is not a Coherent risk measure, as the capital requirement C does not satisfy Convexity[4].

4. Monte Carlo Methods

In this part, the estimations of $VaR_{0.99}(L_{t+1})$, $ES_0.99(L_{t+1})$ and $C(L_{t+1})$ by using Monte Carlo simulation method are presented. And we compare these estimations with the results of historical estimation method. The remainder of this thesis is about that we assume the dependence structure between risk factors of the vector X_{t+1} can be described as Student's t-copula instead of Gaussian copula. Then we apply a discount factor 0.9 to estimate the VaR and ES. At last, with a calibrated Student's t-copula and 10000 simulations, we compute a new capital C. We assume that the vector X_{t+1} of risk factor changes between t and t+1 follows a multivariate normal distribution:

$$X_{t+1} \sim N(\mu,\Sigma)$$

In this case, μ is the mean vector of X_{t+1}, Σ is the covariance matrix for X_{t+1}. We did 10,000 simulations, and find out $VaR_{0.99}(L_{t+1}) = 75454.38$, $ES_{0.99}(L_{t+1}) = 85630.77$ so that we got the result:

$$C = 0.9\big(0.3VaR_{0.99}(L_{t+1}) + 0.7ES_{0.99}(L_{t+1})\big) = \$77,725.65$$

We can find that the $VaR_{0.99}(L_{t+1})$ and $ES_{0.99}(L_{t+1})$ is bigger than multivariate normal distribution's results, cause the student-t copula has a sharper peak and heavier tail than the normal distribution, which means that as a result, the probability of extreme values is greater than that of normally distribution. Also, this Monte Carlo method can be used for various distributions of risk factors X_{t+1}, and it has strong ability to deal with nonlinear and non-normal problems. So that it can be applied flexible when model changes, and we can apply more models to fit the data to do a more reasonable prediction. [9]

5. Conclusion

In this paper, we presented three different methods for estimating VaR and ES of our small portfolio of four stocks during a given time period. The implementation process of each approach was discussed along with their advantages and disadvantages. This was done for the purpose was calculate the regulatory capital requirement for the investment portfolio, which the capital our investment portfolio needs to hold in reserves to have adequate protection against the risks we take on as an investment fun and shocks in the economy.

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The Fundamental Need of Reform in Company Law in England: Parent Company's Liability for Debt of Insolvent Subsidiary

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ABSTRACT

Based on the fact that the parent company has actual control over the subsidiary company, this paper analyzes the possibility of the parent company using the subsidiary company to seek benefits and damage the interests of creditors. Moreover, under the intangible protection of the current limited liability system and the independent personality of the company, it can "retreat". This is undoubtedly against the original intention of the establishment of enterprise groups and has great potential harm to creditors. In addition, on the basis of the relief measures for the rights and interests of the parent company caused by the bad behavior of the subsidiary, the legal defects that should be carefully considered are determined. Considering whether there are other remedies that may have the same effect as disclosure, some are more moderate than disclosure. With Britain's strong caution about lifting the veil, a more moderate direction could be considered.

1. Introduction

"It is a common palace of commercial life today that businesses are conduct not only in the form of a single private or public company, but also in the form of a group of companies consisting of a holding company and a number of wholly owned subsidiaries and possibly sub-subsidiaries."[1] As a matter of English law, the limited liability system of the company is established by the limited liability law of 1855. Besides, the introduction of company law of 1862 strengthened the status of independent corporate personality of the company. Therefore, limited liability also applied for corporate groups because of its separate personality. With the emergence of corporate groups structure, it is evident to see its advantages [2]. Replacing market relations with hierarchy inside of corporate groups can save transaction costs, particularly groups integration helps to internalize the positive externalities generated by exchanges[3]. Although the form of corporate groups makes huge progress in business world, it also brings problem that the possibility of holding company abuse limited liability system. For example, a parent company may undercapitalize its subsidiaries and use all the financing it provides to facilitate transactions that are opposite to its subsidiaries but beneficial to the group. When the parent company proves that the debt is equal, it is allowed to accept the management policy of the parent company at the expense of creditors. The moral effect of the bankruptcy claims of the parent company has not been examined, and the whole class of creditors are under constant threat[4]. The argument relating to parent company's liability for debts of insolvent subsidiary is a common subject in this field. In other word, under the protection of the principle of limited liability, it is no liability to credi-

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tors of the subsidiary even if the parent company controls the subsidiary but not excessed control.

This paper from three parts to analyze why the law of holding company's liability for debts of insolvent subsidiary should be reformed urgently. In first part, it states the existing provisions base on principle of limited liability and separate legal personality. Furthermore, listing the disadvantages of existing law and unfair conditions which can prove that it is necessary to be reformed on existing law. The next part argues the possibility of abuse limited liability in the relationship of parent company and subsidiary. Combined with the provisions of the law on the rights of the parent company to its subsidiaries and the reality of injustice to prove the necessity of reform. The last part examines the remedies of limited liability – lifting the corporate veil. This part analyzes the disadvantages of remaining lifting the veil provisions and points out the strong entity law in the UK that the judge merely lifting the veil. Thus, there is no match between the existing system and the abuse of the system, so reform is urgently needed in this field.

2. Limited Liability, Separate Personality and Existing Abuse Condition

Not literally, parent has guardianship to children, subsidiary is entirely independent from parent company because of corporate separate personality. The concept of separate personality originated from the industrialization of Great Britain in the 19th century. At that time, the Victorian Government encourage entrepreneurs to carry out new business activities by eliminating the personal responsibility risks of directors, senior managers and shareholders of start-up business companies, so that quasi entrepreneurs would be more willing to participate in medium to high-risk business strategies and corporate diversification, which would lay the foundation for the prosperous economic future of Great Britain [5] . According to Company Law 2006, once a subsidiary is established, it has a separate legal personality directly. In addition, "the limited liability of the corporate shareholder is a traditional cornerstone both in Anglo-American corporation law and in the corporation law of the civil system."[6]Accordingly, in the text, this principle is normally illustrated by the notable case of Solomon v. Solomon Co., Ltd (Solomon case). The judgment and its interpretation of this case which issued by the Supreme Court has the guided meaning for the subsequent long-term judgment of limited liability cases. Solomon was supported by the Supreme Court in the final decision. The Supreme Court overturned the previous two judgments, which held that Solomon company is independent of the shareholder Solomon which is not affected by other factors: (i) other shareholders except Solomon are in family relationship. As for this fact, the lower two courts held that this is a one-person company in reality. However, the Supreme Court suggested that the Company Law does not exclude the shareholders with family relations from establishing a company; (ii) the establishment of Salomon company is not used to evade debts, because the establishment of the company is based on the good business conditions of Salomon, there is no debt evasion; (iii) the creditors should pay attention to the poor business conditions of the debt company[7]. The Solomon case is a milestone in the limited liability system. When limited liability applies to corporate groups, each company is protected from the obligations of other parts of the business. The limited liability of an enterprise has become the limited liability of every level in the enterprise. According to the traditional doctrine, this kind of corporation group has the same limited liability interests as the individual investors of Corporation in the history of common law.[8] Therefore, as an independent individual in business, the subsidiary has responsibility for its own debts.

The separate legal personality of corporation is emphasizing with the confirmation of limited liability by Salomon case. "And in Adams v cape industries plc (1990) the court of appeal took the opportunity to examine at great length the way the courts have lifted the veil of incorporation in the past and narrowed significantly the way in which the courts could do so in the future."[9] In the case of Cape, the court examined fact with three factors. Firstly, the court examined the major "single economic unit" where group structures were treated as being a single entity[10]. The second factor is the point of "corporate veil" where the subsidiary is the façade concealing the true facts[11]. whether the subsidiary company is actually only an agency company of the parent company. The third one is the argument of "agency" that the actions of the subsidiary would bind the parent[12]. The court rejected the argument based on three circumstances in which the veil of incorporation can be lifted "Thus as none of the three veil-lifting categories applied Cape was not present in the USA through its subsidiaries."

According to the three standards left by the judgment of the Cape case, the limited liability system is likely to become the protect shade of the conductions that the parent company damages the interests of subsidiaries, creditors or engages in other illegal activities. Once the abuse emerged, the creditors of subsidiaries will be the most seriously damaged party. Moreover, it does not exclude that the parent maliciously makes the subsidiary into insolvent procedure. For example, collusion with the parent

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company, maliciously transfer the assets of the subsidiary company; in the case of few assets, maliciously use the means of separating the share dividend. Return the starting point of the establishment of company limited liability system, it is service for reducing the debt burden of large enterprises in the market, so as to play a supporting role better in business. However, the existing cases of abuse of the limited liability system indicates that it will violate the original intention of the establishment of the system if the system remain unchanged. The law will not advocate the behavior of evading responsibility and escaping debt, but there are many facts that parent companies make use of subsidiaries to make profits and escape debt, so the field needs to be reformed.

3. Parent Company and Subsidiaries

Under the law, the parent company has considerable latitude to take harmful actions against its subsidiaries. In the company group, although the subsidiary has the formal independent legal personality, it should obey the arrangement of the parent company in the actual operation and serve the overall interests of the group company, which makes the independent legal personality of the subsidiary empty. For example, the regulation of Company Law 2006 the acquisition or holding of another company's equity, of the contractual arrangement of the control right between companies, of the centralized exercise of the company's voting right, and of the chain directors are all typical provisions of the company law affirming the company's control. On the one hand, the control of the parent company over the subsidiary is mainly lies in the proportion of shares and the voting right of the resolution matched by the proportion of shares. "Power is used in a group of companies to ensure that each member complies with the wishes of the controller, usually the parent. The way parental control works can be divided into the legal and the 'factual' forms." Legal form indicated on the provision that the parent company has compulsory power to dismiss or remove the directors. In addition, the legal voting right of the parent company enables it to control the contents of the articles of association of the subsidiary and the articles of association of the board of directors. The parent company also exercises "extralegal" or "de facto" control over its subsidiaries by exerting pressure or influence to determine the choice of directors. As for "factual" form, the parent company truly controls the activities of the subsidiary by controlling its directors. As a trustee, the director's duty is to exercise a certain degree of prudence to the subsidiary, taking the benefit of the subsidiary as the management goal. When the parent company's behavior is superior to the director's obligation to the subsidiary company, the parent company may intervene in the subsidiary company's affairs by preventing the director of the subsidiary company from performing his duties. But for the determination of "interference", there must be enough causality to produce the duty of care. It can be said that the behavior of directors must be directly affected by their parents. On the other hand, the parents have the right to choose the source of funds for the subsidiary. The capital of a subsidiary usually consists of debt and equity. Debt financing is usually obtained from the parent company or bank in exchange for commercial paper with different degrees of security. Equity financing is to raise funds by issuing shares and these shares have different rights and usually give the holder a certain degree of control.

As the conventional legal view of the parent-subsidiary relationship in England treats the parent as no more than a shareholder, shareholders have no liability to anyone expect to the extent and manner provided. Besides, the Company Office Association (COA) recognizes that the subsidiary is establishes the basic principle of "legal personality" according to the general law and believes that the Solomon principle also applies to the enterprise group, though it is the product of the parent company. Similarly, parent company as a majority shareholder who has no liability for debts to its subsidiary. The harmful act of the parent company itself will not cause any litigation, thus affecting the claim right of the parent company in the liquidation of the subsidiary. In fact, with the exception of remedies related to fraud, capital maintenance and illegal and fraudulent transactions, creditors of subsidiaries have no recourse to the parent company or other group companies due to the principle of independent personality. Parent companies can use subsidiaries outside these relatively independent boundaries "for their own benefit". They can manage its affairs as they wish, as long as they acted intra vires and in good faith. Therefore, the parent company was excluded the liability of the parent company for the debts of the subsidiary as an outsider only if they are in good faith, ignoring that the benefits the parent company obtained in the group structure came from the convenience of controlling the subsidiary company. "Just as an individual can act like a fool so too can a company. "Under the limited liability, the parent company suggest those who do business with its subsidiaries assess the economic situation of subsidiaries by themselves. Moreover, it is incomprehensible that "if the subsidiary is a success profit will be forthcoming to the parent but if it fails the parent is allowed to prove its debts and be treated pari passu with other creditors." The parent company has the possibility to operate the directors of the subsidiary company, but the supporting power relief does not provide any

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direct responsibility between the parent company and the subsidiary company.

The law in England fails adequately to attribute any responsibility to a parent in this role instead of the large scope of autonomy in legal interpretation that the parent company can use. However, it is the possibility of power abuse. The abuse of power is directly proportional to the size of interests. A practical economic theory held that the use of control is for the best interests of the parent rather than the subsidiary." For more than 14 years the recommendations of the Cork Report concerning the potential for abuse of the parent-subsidiary relationship and intercompany indebtedness have fallen on deaf legislative ears." Reform proposals to date have been conspicuously deficient.

4. The Need of Reform on Remedy Method of Limited Liability

As a remedy means of abusing limited liability, the existing uncovering system is far from the ideal effect, "the starting point in group structure veil-lifting cases has always been that Salomon doctrine applies unless there are other reasons for lifting the veil." Since the decision of the house of Lords in Salomon v. Salomon limited, it has number of cases for courts to peep behind the company's veil. However, it is difficult to find a unified theory to uncover the company. The creation of "unveiling the company" was derived from the case of U.S. v. Milwaukee refrigerator Transportation Co in 1905. In the judgment of the case, judge Sanborn made a classic statement on the principle of unveiling the company:

"…as far as the general rules are concerned, the company should be regarded as a legal person and have an independent personality unless there are sufficient reasons to the contrary; however, if the corporate characteristics of the company are used as a tool to damage the public interest, legalize illegal acts, protect fraud or defend crimes, then In law, the company should be regarded as a combination of several persons with no right and ability."

"Unveiling the company" is an important method to deal with the responsibility of parent company to subsidiary company in common law countries. That is, according to the specific facts in the specific legal relationship, the independent personality and limited liability of the company and its shareholders are denied, which is also the core of the theory. In order to prevent the abuse of the company's independent personality and protect the interests of creditors and social public interests. As an exception and supplement to the limited liability of shareholders, it corrects and balances the personality independence and limited liability required by the traditional legal person system.

There are other methods which define the liability to subsidiaries that the parent has, except the piercing veil system. Such as the system of fraud and improper transaction. Although existing systems try to correct the abuse of corporate form, they will never discuss the control relationship between parent company and subsidiary company for the benefit of creditors with a minimum standard of conduct that deters abuse of this power. The futures of Limited liability and separate personality are so fundamental that any changes to the status quo would result in widespread confusion and uncertainty. Therefore, the focus of the reform must be to seek both other doctrines that support the phenomenon of corporate groups and recognize the superiority of Solomon v. Solomon Co.

The British court is particularly cautious to unveiling corporate veil with a strong entity law. It strictly complied the Solomon principle within the scope of enterprise groups. This was reflected in the Adams case, where the COA argued that, unless permitted by law, the court would not ignore the corporate veil when required by justice. For instance, in Okpabi v RDS case, the court insisted on the judgment that not lifting the corporate veil, though the huge damages and environmental pollution caused by the company. In the Re Augustus Barnett & Son where an unsuccessful attempt was made to make a parent liable for the debts of its subsidiary under the fraudulent trading section of Insolvency Act 1986, s.213. Most business activities are highly integrated across entities within a group. The strong entity law could be unfair to the involuntary creditors of an insolvent subsidiary because the UK courts are reluctant to hold a solvent parent responsible for the debts of its subsidiaries. Although the court has already shown its attitude towards the tort liability that the parent company has in Chandler v Cape case, it is conspicuously that limited liability system is powerful. In England, due to the strict priority rules and the legal effect of giving equal distribution rules, the legislative system does not allow to modify the relationship between claims and debts. Second, not recognize the damage that the subsidiary may suffer in the hands of the parent company. The reason for this is that the role of the parent company as the controller of the subsidiary is not recognized. Third, to insist that the company in a group is the legal paradigm of atomism, each of which has its own different creditors and a long history.

This deficiency in the law can be made up by a legislative measure. There is another way to solve the problem of responsibility attribution between parent and subsidiary companies, focusing on the supervision of parents' control over subsidiary companies, rather than just unveiling the

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veil. This subordination remedy is adopted to balance the rights and interests among the creditors of the bankrupt subsidiary according to the former behavior of the parent company to the subsidiary company. Here, the conflicting interests are essentially the interests of the parent company and other creditors. When bankruptcy is imminent, if the interests of external creditors are found to be unfair, the interests of external creditors shall prevail over the interests of the parent company. It is necessary to review all previous actions of the parent company as controller when necessary.

For the problems of debt, the principle of equity can be introduced in system, which provides a set of legal basis for reference and improvement. It can be observed that, lifting the veil is an uncertain and extreme remedy in the UK that the courts will refuse in most cases. The introduction of a broad concept of equity can solve some of the shortcomings of the rigid priority system. Meanwhile, it can be recognized that the concept of "unfair behavior" is based on the determination of the minimum standards of behavior that a parent company should abide by when dealing with its subsidiaries. If the parties are to benefit from a business transaction or association, they must act in a way that balances their own interests with fairness, honesty and legitimacy. Subordinate remedies will allow for the evaluation of the parent-child relationship and give creditors the opportunity to claim on the assets of the parent company without replacing Solomon. Putting off debt to equity is far less drastic than lifting the veil.

5. Conclusion

This paper starts with the fact that the parent company has the actual control power over the subsidiary, analyzing that the parent company is likely to make use of the subsidiary company for profit and damage the creditor's interests. Moreover, it can "retreats" under the intangible protection of the current limited liability system and the independent corporate personality of the company. This is undoubtedly a violation of the original intention of the establishment of enterprise groups, which has great potential harm to creditors. Besides, based on the remedial measures of the parent company's rights and interests arising from the harmful acts of the subsidiary company, the deficiencies in the law that should be carefully considered are determined.

Considering whether there are other relief measures that may have the same effect as uncovering, and some are more moderate than uncovering. Because of the strong caution about lifting the veil in the UK, it can be considered in a more moderate direction. Thus, the standard of conduct should be an "open" concept, stipulating the obligation of fair or faithful management, and combining with the mechanism of allowing equal exceptions.

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On the Transmutation of Media Management Concept under the Trend of Media Fusion

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ABSTRACT

Under the background of rapid progress of science and technology, the trend of media integration is constantly strengthened, which urges the original media management concept to be constantly changed and to form a new media management concept. In order to apply to the development needs under the trend of media integration. This paper summarizes the media integration, analyzes the influence of the media integration trend on the media management concept, explores the direction of the evolution of the media management concept under the media integration trend, and aims to provide a reference for the development of the media industry.

1. Introduction

The reform of China's media operation system is slower and more careful than in other areas. With the arrival of the new media era, the traditional media represented by radio, television and newspapers have been greatly impacted, and their survival and development space has been gradually squeezed. The rapid development of new media does not mean the demise of traditional media.

2. Overview of Media Integration

The development of science and technology, in the process of digitization and networking derived new media, new media based on the network platform has a significant fusion function, so that the three major types of media plane, radio waves, network to achieve integration, so that the traditional media fusion, so that the sender of information and the receiver of information fusion and so on. Such a powerful fusion function and accurate contact with the audience make the new media have obvious interactive characteristics, cross-temporal characteristics, break many restrictions of traditional media, and be sharp in the media market. Traditional media need to learn from and integrate with it, which makes media integration an inevitable trend of news media development. The first is resource sharing, the only way for the development of mass media industry is the confluence of resources and the formation of resource platform. In the new media pattern, the network media expansion means is the cooperation, the network media and the radio and television media, the newspaper media carries on the cooperation, thus causes more content to legalize, enables the live reporter to carry on the authoritative release[1]

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Secondly, it is reflected in the integration of channels and terminals, and in the integration of the Internet and traditional media channels, there are many new media, such as network television produced by the integration of television and Internet functions, network broadcasting produced by the integration of radio and television functions and the Internet. Finally, the development of new media will promote the complete integration of traditional media and new media, which can produce greater value and the industrial chain can be closer. At present, under the background of media integration, the traditional media is facing a serious crisis in all aspects, and the traditional development model can no longer adapt to the great changes in the large media market.

3. Impact of the Trend of Media Convergence on the Concept of Media Management

In the social development, the media is its basic motive force, the emergence of new electronic media will certainly have a profound impact on all aspects of society, will directly affect the management of the media, Many old media norms and concepts play a role in the new media era, but these must be updated with development.

3.1 Overturning the Operation Mode of Traditional Media

In the media operation mode, the communicator, the carrier and the audience are the three indispensable elements, and the media operation mode is the coupling between the communicator, the carrier and the audience. The revolution of the Internet broke the barrier of the mass media monopoly of the right to speak, and removed the strict decomposition between the communicator and the audience. In the operation of traditional media management, the communicator of information mainly transmits the broadcast content unilaterally and linearly to the audience. In this process, there is no interaction and feedback, and the audience is in the state of passive receiving information. In such a system, communicators occupy an active position, mainly reflected in the content of Wang. However, under the new media conditions, due to the characteristics of openness and interactivity, the operation mode of media management has changed greatly. The rise of new media and the integration of various media give the public the opportunity to express their views. Use the Internet platform to display their own text, music, video and so on. Under the condition of traditional media, only some people have the right to speak, and everyone can have the right to speak under the condition of new media. This phenomenon is highlighted by the emergence and development of Weibo. The operation mode of media management under media fusion shows more characteristics of audience being king, product being king and platform being king. Under the condition of audience spreading and spreading, the application service value of networked platform will appear geometric growth mode. In this case, the trend of media integration makes the media operation mode change from the communicator as the center to the audience as the core, the media entity and the information provider as the auxiliary operation mode. Thus, the media management mode is transformed under the new technology and the efficiency of media operation is improved.

3.2 Forming A New Type of Media Industry Chain

With the development of digital multimedia technology, the traditional media has the wings to take off in technology, and the traditional media has the ability and strength to challenge the terrestrial digital television and telecommunication data service. Based on this, the traditional radio and television industry has changed, with programs and information as products, transmission channels into terrestrial wireless, cable radio, satellite, telecommunication network, terminals into a variety of personal and home screens, thus creating such a new industrial chain. The three industries of radio and television, telecommunications and publishing have been introducing new media business, which makes the three industries become blurred and tend to disappear. In the whole system of media fusion, the first fusion is technology, the integration of technology promotes the integration of content, network and terminal in the media industry chain, and then begins to merge in production and application. The change of technology makes the product, transmission and service terminal change. In the industrial form of media integration, there are vertical integration, horizontal integration, cross integration, and the integration of industrial structure is the integration of the system. In the value chain of media industry, content is the source, content is produced in the traditional media industry chain before, content is highly dependent on media carrier, usually only one kind of media content, and lack of blending. This makes the independence of content often ignored. The standardized digital technology breaks through the limitation of various media contents. The content is independent as the upstream cluster of an industrial chain, and the vertical media industry chain structure is broken by using various channels. It forms a new media industry chain structure and uses different integration methods to carry out various services, which is also the key point of media integration. Under the background of media integration, the more dispersed content industry has become a very large

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industrial cluster, providing services to different audience terminals. For example, TV has digital set-top box can be supported by equipment, users can program, watch network video, and play competitive games with netizens. In the future, in order to realize the various needs of terminals, radio and television networks and telecommunications networks should provide a variety of services, whether radio and television cable networks, terrestrial microwave transmission networks, telecommunications satellite communication networks, mobile cellular networks, computer Internet, etc., can be upgraded or modified to better meet the diverse service needs of consumers. It can be seen that the content industry under the trend of media convergence is a very large industrial cluster, which will be involved in many subdivision industries, which will lead to too many business opportunities. For traditional media, it is the way to strengthen the industrial chain. The content industry has a new development platform under the media integration, in this infinite potential market, the radio and television media layout entire industry chain thought will let it obtain the competition opportunity.

3.3 Diversification of the Media Profit Model

Media convergence can form a corresponding profit model according to the characteristics of various media. It can be seen that under media convergence, the scale economy of traditional media has grown with the scope economy. The continuous integration of industries and the application of new technologies make the profit model more diversified and flexible. In this process, the most outstanding performance is that the media fusion breaks through the traditional linear profit model and changes to the flexible network profit model. Through integration and M & A, media integration can be realized, and the profits of enterprises gradually develop to flexible network structure. The integration of media makes the industry produce multiple value links, these different value links can be used as the innovation of profit model, such as online advertising, online game operation, payment recommendation and other new charging methods. In addition, media operators have taken diversification as a consensus, and the single charging model of traditional media is considered to have no ability to resist risks. Diversification has changed the single advertising charge pillar and developed to multiple charging pillars, thus reducing the main dependence on media advertising and increasing the independence of the media, which can stand more steadily, for example, Media business and mobile companies and other cooperation to agent payment business, the latest music, film and television works can be charged. Under the media fusion through the value increment, the value chain governance and so on carries on the profit pattern innovation, thus realizes the value increment, in which through the time and space boundary breaks, can produce the speed economy, through to the channel barrier break, can produce the network economy and so on.

4. The Changing Direction of Media Management Concept under the Trend of Media Integration

4.1 Setting up a Macro Market Concept

Compared with the western media industry, China's media industry has great shortcomings in setting up macro concept and overall concept. In management, most of them are confined to all aspects of media operation process. The optimization of resource integration is carried out by market means and the combination of media management and information industry, so that the new industrial value chain can be formed. At present, most of the media organizations with good market-oriented operation have set up market-oriented institutions, especially the new mobile media and network media. This makes the traditional media need to change their thinking, renew their ideas, keep pace with the times and actively invest in the market economy, and promote the integration of media capital into international capital. The scale formation and industrial development of China Media Group cannot be separated from the operation of social and international capital. At present, the media industry is in the primary stage of small wealth growth, we should try to get rid of the current situation, and use joint venture holding, merger and other multiple capital operations to carry out the great integration of resources. The closed management of the traditional media era within the group must be guided by the concept of openness, maximize the role and strength of the internal sub-media and related departments, always adhere to the market as a guide, strengthen the construction of industrial collectivization, and actively explore the integration with the market, society and capital. The system reform of cultural industry is at a critical moment, which makes the traditional radio and television enterprises face new opportunities and challenges, which requires the traditional radio and television enterprises to take capital as a link to promote the merger and reorganization of cultural enterprises[2].

4.2 Good Sense of Service

The media has the function of guiding public opinion and transmitting information, and should also set up the consciousness of service for the audience. Before the emergence of new media, communicators were in the leading

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position, the service consciousness of the audience was often easily ignored, the media service consciousness was relatively weak, and the lack of accurate grasp of the service connotation was accompanied by the development of science and technology and information technology. Media integration has given birth to some new media, which has a very important impact on the way of life, information acquisition and other aspects of information media, and to a certain extent has impacted the traditional service concept, produced a new service concept, in order to adapt to the development of the new situation and promote the realization of economic and social benefits of media management. For example, after media integration, TV programs are broadcast through the Internet, and the audience can interact with the communicator through Weibo, telephone and so on. The establishment of service consciousness makes radio and television interactive programs emerge constantly, and these interactive programs are constantly innovating in form. After the reform of media collectivization, the development of media industry gradually formed the wings of news propaganda and industry management, which made the market and service become more closely inseparable. In the process of docking with the market, the media group cannot fix the mode of thinking on the production and marketing of content, but should take good service as the starting point when setting foot in the business field, and combine with the advantages of the traditional media. Even extended to the tertiary industry. Under the development trend of media integration, media industry operators need to pay attention to service, fully realize the soft power of service, establish good service consciousness and enhance competitiveness. The advanced media service concept can effectively promote the improvement of service level. Good service concept is a strong competitive strategy, can be both sides to achieve win-win.

4.3 Attaching Importance to Talent and Technology

Under the trend of media integration, the traditional media can no longer enjoy resources and space alone, and the media content pays more attention to low cost input and high return output, which has higher requirements for the practitioners of the media industry. In other words, in media production management, we should adhere to the concept of people-oriented, pay attention to the training of staff, so that the professional skills and comprehensive quality of staff can be continuously improved, and constantly enhance the ability of team cooperation. Strengthen the introduction and training of complex talents to enable staff to undertake multi-functional work in media integration. The progress of science and technology promotes the continuous change of media form, promotes the change of information dissemination mode, and has an important influence on management. The application of science and technology is constantly excavating new fields of media. With the rapid development of science and technology, media operators need to attach great importance to new technologies[3].

5. Conclusion

In the era of media integration, it is necessary for the media industry to choose the business model correctly, to allocate all kinds of resources optimally, to promote the benign development of the profit model, and to better achieve the best state of economic and social benefits.

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