Aims & Scope

Contemporary Social Sciences aims to present the most outstanding research and achievements in the field of social sciences in China. The scopes of research fields for consideration include, but not limited to political science, economics, literature, linguistics, journalism and communication, education, sociology, philosophy, history, law, and interdisciplinary research. *Contemporary Social Sciences* enhances the international discourse of China and seeks to promote communication and cooperation between scholars from China and the rest of the world.
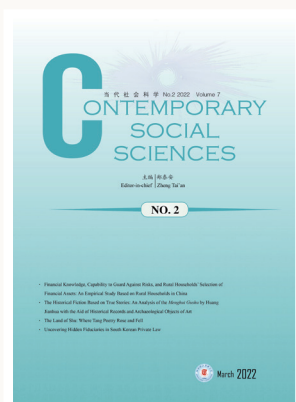
A Brief Introduction to the English Periodical of *Contemporary Social Sciences*

The English periodical of *Contemporary Social Sciences* is an English bimonthly periodical founded by Sichuan Academy of Social Sciences and approved by the National Radio and Television Administration of the People's Republic of China (formerly the State Administration of Press, Publication, Radio, Film and Television of the People's Republic of China) in March 2016. As the first English periodical sponsored by a local academy of social sciences, it fills the lack of English periodicals by local academy of social sciences nationwide. In accordance with the requirements of the State Press and Publication Administration of Radio, Film and Television, this periodical will "adhere to correct direction of operation, publish outstanding research achievements in the field of social sciences of China, demonstrate the excellent research achievements in the development of western China and China's opening up, promote the academic achievements in order to 'go global' and enhance China's international discourse in the field of social sciences."

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Contemporary Social Sciences engages famous experts to join the editorial board. Some of them are from Chinese Academy of Social Sciences, local academy of social sciences and universities, and Party schools nationwide, and some are outstanding sinologists from Harvard University, Cambridge University, and Oxford University. It engages foreign experts with good English and Chinese proficiency as professional reviewers.

The inaugural issue of *Contemporary Social Sciences* was published in October 2016. It is a bimonthly publication according to the requirements of the State Press and Publication Administration of Radio, Film and Television and there are totally six issues per year.

CONTENTS

Financial Knowledge, Capability to Guard Against Risks, and Rural Households' Selection of Financial Assets: An Empirical Study Based on Rural Households in China

Wang Yang, and Huang Lan*

Chengdu University of Information Technology

Abstract: Based on rural household data collected in two rounds of the China Household Finance Survey (CHFS) in 2015 and 2017, respectively, this paper presents the likely impact of financial literacy and capability against risks on the breadth and depth of participation by rural households in risky financial markets. After instrumental variables are used to solve endogenous problems, we find that a good command of financial knowledge and a higher risk management level could significantly increase the probability and proportion of rural households investing in risky financial assets. A mechanism analysis further reveals that financial knowledge motivates rural households to engage in financial investments by helping them evaluate their capability to guard against risks. After multiple dimensions of indicators are employed to measure financial knowledge, the estimated results remain stable. In view of this, we have put forward some policy suggestions to increase the property income of rural households and promote the rural financial market.

Keywords: rural households; financial knowledge; risk management; financial assets

*   Wang Yang, School of Statistics, Chengdu University of Information Technology;
     Huang Lan, School of Statistics, Chengdu University of Information Technology.
     Corresponding concerning this article should be addressed to Huang Lan, School of Statistics, Chengdu University of Information Technology, Chengdu. Email: hanglan@cuit.edu.cn

Introduction

Rural households in China have been finding it difficult to purchase financial products due to a lack of opportunities to invest in financial assets and limited access to modern financial services in rural areas. This has not only deprived rural households of the chance to obtain property income (Li Tao et al., 2010), but also further widened the urban-rural income gap (Wen Tao et al., 2005). Chinese households have been investing an excessive proportion of their wealth in real estate and deposits, while investments in financial risk assets have been steady at a low level. On top of this, the percentage of rural households purchasing stocks and funds in the risky financial markets has been much lower than that of their counterparts in urban areas (Dong Xiaolin et al., 2017; Fei Shulan, 2017). This has been corroborated by data (as shown in Table 1) collected in four rounds of the CHFS in 2011, 2013, 2015, and 2017. For example, in 2017, the stock market participation rate was 9 percent among urban and rural households in China. Specifically, 13 percent of urban households chose to invest in the stock market, while the figure for rural households stood at only 0.57 percent. The fund market participation rate was 3.09 percent in China. Only 0.17 percent of rural households participated in the fund market, far lower than that of urban households (4.46 percent).

Table 1   Differences in Financial Market Participation Between Rural and Urban Households in China

Year	Stock Market Participation Rate			Fund Market Participation Rate		
	Urban Households	Rural Households	Nationwide Households	Urban Households	Rural Households	Nationwide Households
2011	16.56%	1.89%	8.84%	7.56%	1.26%	4.22%
2013	11.13%	0.41%	6.49%	5.18%	0.42%	3.13%
2015	14.67%	0.49%	9.42%	5.01%	0.42%	3.28%
2017	13.01%	0.57%	9.0%	4.46%	0.17%	3.09%

Note: This table is based on data collected in four rounds of CHFS: 2011, 2013, 2015, and 2017.

The single investment structure of rural households in China hinders not only the healthy development of the rural economy, but also the growth of their assets. To alleviate the difficulties of rural residents in participating in the financial markets and improve the rural financial service system from a macro perspective, the government has ramped up its efforts to invest more financial resources on the supply side (Zhang Longyao et al., 2013; Wang Shuguang, 2014). For example, in 2019, the People's Bank of China (PBC), the China Banking and Insurance Regulatory Committee (CBIRC), the China Securities Regulatory Commission (CSRC), the Ministry of Finance (MOF), and the Ministry of Agriculture and Rural Affairs (MOA) jointly released the Guidelines on Finance Serving Rural Vitalization (hereinafter referred to as the Guidelines).[①] The document specifies that it is necessary to improve the financial services system for rural vitalization and guide relevant

http://www.pbc.gov.cn/en/3688110/3688172/4048311/3764402/index.html

financial institutions to empower rural communities. Finally, this document will contribute to a reasonable allocation of financial resources between rural and urban areas and an equal distribution of financial resources across these two areas. Although many policies and measures have led to some achievements, progress in empowering rural communities through financial services depends not only on the scale of capital investments on the supply side but also on the efficiency of rural households in utilizing such financial services on the demand side. Financial investment is a complex process for many households, as it takes a huge amount of time and energy to search for relevant information and analyze it before making a decision. Financial knowledge, which plays a vital role in screening and analyzing information, determines the success or failure of a financial investment to a considerable extent (Noctor et al., 1992; Song Quanyun et al., 2020). Therefore, it was important to strengthen the scale of capital investments in rural areas at a macro-level. However, this did not mean we could neglect the need to enhance the financial knowledge of rural households and improve their ability to allocate financial resources (Wang Dingxiang et al., 2013). Of note, to participate in the risky financial markets, investors must have a decent level of high financial literacy and be able to evaluate risks and returns of financial assets independently. This could enable them to identify financial products that suit their circumstances (Yin Zhichao & Qiu Hua, 2019). Investors who lack the necessary financial knowledge were prone to cognitive and behavioral biases, thereby limiting the breadth and depth of their participation in the financial markets (Rooij et al., 2011; Zhang Longyao et al., 2021).

Unfortunately, rural residents in China generally have limited financial literacy, resulting in their limited understanding and inadequate mastery of financial knowledge. In November 2018, the China Foundation for Development of Financial Education issued the first *Sample Survey Report on Financial Literacy of Rural Residents in China*. The report showed that rural households had limited access to financial knowledge or financial training, and most of them had only limited mastery of basic financial literacy. The 2017 CHFS also found that the lack of financial knowledge was the main reason rural households refused to participate in risky financial markets such as the stock market and fund market. Specifically, 75.46 percent of rural households did not[1] participate in the stock market because they had no knowledge about stock trading. A total of 65.52 percent of rural households gave up investing[2] in the fund market and over 70 percent rejected the idea of purchasing financial

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[1] In the CHFS conducted in 2017, when asked "Why doesn't your family have a stock account? Respondents gave the following reasons: a. A lack of knowledge about stock trading b. Difficulties in opening an account/unable to open an account c. Excessive risks in stock trading d. Limited capital e. No interests f. Others." According to the statistics of respondents, we can obtain the proportion of rural households giving up investment in the stock market due to a lack of knowledge about stock trading.

[2] In the CHFS conducted in 2017, when asked "Why didn't your family buy a fund?" Respondents gave the following answers: a. A lack of knowledge about fund. b. Difficulties in opening an account/unable to open an account c. High fund risks d. Low returns from funds e. Limited capital 6. No time/interests f. Others." According to the statistics of respondents, we can obtain the percentage of rural households giving up investment in the fund market due to a lack of knowledge about fund.

products for similar reasons.[①] This fact has also suggested that rural households need to improve their command of financial knowledge, and that the spread of financial knowledge in rural areas has the potential to create positive dividends.

As increasing government emphasis has been focused on agriculture, rural areas, and farmers, and a series of inclusive financial measures have been implemented, a boost has been given to the economy and financial markets in rural areas. This has created a diversified range of financial assets for rural households. As the income of rural households continues rising, there are three questions that need to be answered: (a) What is the impact of financial knowledge on rural households' financial investment behavior? (b) Can the breadth and depth of rural households' participation in the financial markets be improved? (c) What is the mechanism to achieve this purpose? At present, there is a limited amount of literature on these topics. Therefore, it is of great practical significance to study the relationships between financial knowledge and financial investments of rural households and the possible mechanisms that may impact their investment behaviors. This will not only help shed light on the deep-seated reasons inhibiting financial investment behaviors of rural households but also provide some basis for decision-making departments in formulating relevant policies. Rural households can expect to increase their property income by improving their financial investment abilities.

In view of this, we utilize data from two rounds of the CHFS conducted in 2015 and 2017 to study how financial knowledge is affecting rural households' participation in the financial markets and their selection of financial assets, and to reveal the possible mechanisms. The main contributions of this paper include: (a) Much of the existing literature focuses on studying financial asset selection behaviors of urban households but ignores factors affecting the financial investments of rural households. This paper attempts to make up for this omission by looking at the financial knowledge level of rural households; (b) The mechanism analysis of this paper finds that financial knowledge has an effect on rural households' decisions on financial asset investments by affecting their subjective and objective capabilities against risks; (c) In this paper, the lagged variable of financial knowledge and the corresponding instrumental variable are selected from the sample of rural households in the CHFS studies conducted in 2015 and 2017 to deal with the endogenous problems caused by reverse causality and omitted variables. In this way, the endogenous bias is overcome to the greatest extent, rendering the empirical results more credible; (d) This paper constructs indicators with multiple dimensions to measure the level of rural households' financial knowledge, enabling conclusions to be more robust.

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① In the CHFS conducted in 2017, when asked "Why didn't your family buy any financial products?, respondents responded as follows: a. A lack of knowledge about financial products b. Complexities in buying financial products/unable to buy financial products c. Excessive risks in financial products d. Low returns from financial products; Limited capital e. No interests/time f. Others". According to the statistics of respondents, we can know the percentage of rural households giving up investment in financial products due to a lack of knowledge about such products.

Literature Review and Research Hypotheses

Influence of Financial Knowledge on Rural Households' Selection of Financial Assets

Financial investing is a complex decision-making process that should be underpinned by financial knowledge. Foreign studies have found that financial knowledge had a significant impact on savings, credit, and investments of households (Lusardi & Mitchell, 2014). Investors who did not understand the basic economic and financial concepts and lacked basic financial calculation skills faced a higher risk of investment failure and tended to give up investments (Hastings & Tejada-Ashton, 2008). Poorer and less financially literate households were prone to make more investment mistakes (Calvet et al., 2009) and were more vulnerable to wealth reduction. Financially educated households tended to save more and were less indebted than those who could not calculate installment interest rates correctly (Bernheim & Garrett, 2003), and financially literate households were accumulating wealth faster (Stango & Zinman, 2009). In addition, households who mastered professional financial knowledge were generally more willing to participate in the stock market. With more advantages in the stock market, they held a higher proportion of risky assets (Rooij et al., 2011).

Most domestic studies on financial knowledge centered on micro-level benefits of financial knowledge and their impact on the participation of urban households in the financial markets (Zhang Longyao et al., 2021). However, there were few studies dedicated to the impact of financial knowledge on the financial investment behaviors of rural households and the potential mechanism. Yin Zhichao et al. (2014) used the data of the 2013 CHFS and found that an increase in financial knowledge and investment experience would encourage households to participate in the financial market and hold a higher proportion of risky financial assets. Shan Depeng (2019) studied the impact of financial literacy on urban poverty in China in accordance with the data from CFPS. He found that improving financial literacy through financial education was an important approach to reducing urban poverty. Financial knowledge could also have a positive effect on entrepreneurial decision-making and performance (Yin Zhichao et al., 2015; Sun Guanglin et al., 2019). A better command of financial knowledge could also help rural households gain access to formal credit and ease credit restrictions (Wu Yu et al., 2016). Guo Yan et al. (2020) discovered that improving financial knowledge played a greater role than the construction of hardware facilities, such as information equipment, in developing rural financial markets.

Most of the existing domestic and international studies have confirmed that financial knowledge, as a bridge between financial resources and financial investment practices, is a crucial factor affecting the financial investment of urban households. However, most rural residents in China, beset with a traditional mindset, are unconscious of the importance of financial management and lack financial knowledge. These two factors represent a bottleneck restricting their participation in the financial markets. We can speculate that a higher financial literacy level of rural households will not only help to expand channels for rural households to borrow money but also alleviate financing constraints in

financial investments. Moreover, better financial literacy would upgrade the ability of households to manage risks, thereby expanding the depth and breadth of their participation in the financial markets. Therefore, we bring forward the following hypotheses:

H1: Financial knowledge can expand the breadth of rural households' participation in financial markets.

H2: Financial knowledge can expand the depth of rural households' participation in financial markets.

The Mechanism of Financial Knowledge Influencing Rural Households' Selection of Financial Assets

Households were more exposed to risks when they used risky financial markets to manage their wealth. For example, most investors were excluded from mastering the investment techniques for risky financial assets such as stocks as these assets called for some basic financial knowledge and a certain level of risk tolerance (Wang Xin, 2015). To adapt to the risky and volatile financial markets, investors in the financial markets, most of which are common households and individuals, must consider how to identify risks before investment and manage risks after investment. Some families may be more unwilling to participate in the financial market for the purpose of avoiding risks (Guiso & Paiella, 2008; Li Tao, 2009). The poorer ability of rural households to handle risks, the less likely they are to participate in risky financial markets, and the less they will choose to invest in risky financial products. Thus, our third hypothesis (H3): The breadth and depth of rural households' participation in risky financial markets can be expanded by helping them evaluate their capability against risks and strengthening their ability to handle risks.

Theoretically, financial knowledge can exert an effect on rural households' investments in financial assets by helping them evaluate their subjective capability against risks and strengthening the objective capability of dealing with risks. Meanwhile, a good mastery of financial knowledge helps rural households better understand elements of financial markets and products, such as returns and risks, thus reducing uncertainties when they make investments. Rural households with a better command of financial knowledge are more likely to select products with higher risks, because they are more confident in their capability to deal with risks. Attitudes toward risks have a close bearing on people's financial investment decisions, and financial knowledge will contribute to a better evaluation of their capability to withstand risks and thus allow them to make risky financial asset investments.

In addition, whether rural households could participate in the financial market is determined on the one hand by the inherent risks of financial assets, and on the other hand, by their risk management ability after an investment is made. Generally speaking, the greater the risk of financial assets, the higher the probability of investment failure. If rural households are not able to manage their own risks, they may be forced to give up investment when faced with investment opportunities that come with higher risks and higher returns. However, higher financial literacy can help rural households deal with risks in ways that are more cost-effective and efficient. As a result, if losses

are incurred, they can have enough means to smooth consumption, minimize the negative impacts, and expand investment channels. For example, rural households can purchase commercial insurance in the insurance market to prepare for risks after an investment is made. This move could upgrade their risk management capabilities (Urrea & Maldonado, 2011), thereby forming a relationship chain that covers financial knowledge, the capability to withstand risks, and investments in risky financial assets. Our fourth hypothesis then is (H4): Financial knowledge can encourage rural households to buy financial assets by raising their subjective and objective capabilities against risks.

Data Source, Model Setting, and Variable Selection

Data Sources

The data in this paper is derived from the third and fourth round of the CHFS conducted in 2015 and 2017 by the Survey and Research Center for CHFS, Southwestern University of Finance and Economics. In these two rounds, a three-stage, stratified, proportional to population size (PPS) sampling method was used to collect micro-financial information from Chinese households and provide high-quality micro-data for studying financial issues of Chinese households by means of scientific sampling, modern survey techniques, and survey management methods. Among them, the 2015 CHFS collected micro-data of more than 37,289 households from 1,396 villages (communities) in 351 counties (cities or districts) of 29 provinces (autonomous regions or municipalities). Among these, 11,654 households came from rural areas.[①] The 2017 CHFS collected micro-data from more than 40,011 households from 1,417 villages (communities) in [②] 353 counties (cities or districts) of 29 provinces (autonomous regions or municipalities). Among these, 12,732 households came from rural areas.

These two rounds of CHFS collected detailed information on the demographics, assets and liabilities, insurance and security, income and expenditure, financial market participation, and financial knowledge of rural households in our sample. Specifically, a total of 10,085 rural households included in the 2015 CHFS were followed up in the 2017 CHFS. This accounted for 86.5 percent[③] of the total number of rural households in 2015, providing an excellent amount of data for this study. Among these households, the top 1 percent of households with the highest family income and net assets and the bottom 1 percent with lowest income and assets are phased out; households whose householder was less than 18 years old at the time and those with a missing control variable are also

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① In this paper, only a household whose householder has been registered as a rural resident shall be regarded as a rural household.
② Among the provinces (municipalities) covered in CHFS, 11 came from the east of China, namely Beijing, Tianjin, Hebei, Shanghai, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; 8 came from the central region of China, including Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, anbd Hunan; 10 came from the west of China, including Inner Mongolia Autonomous Region, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Ningxia Hui Autonomous Region, and Qinghai.
③ In 2017, a total of 26,824 households in the 2015 CHFS were followed up, representing 71.9 percent of the total number. Among them, 16,739 urban households were followed, making up 65.3 percent of all urban households in 2015.

edited out. Finally, 9,680 households were left in the sample.

Model Setting

Probit model and tobit model.

We measure the breadth of rural households' participation in the financial markets by determining whether rural households hold risky financial assets. Since this dependent variable is a two-valued variable, the probit model is used for empirical analysis.

$$Y_i = 1(\alpha + \beta FL_i + \gamma X_i + \mu_i > 0) \quad (1)$$

In the formula above, Y_i is a dummy variable that signifies whether rural households participate in risky financial markets. If the variable equals 1, it means the rural household has participated in the financial market; if the variable equals 0, it suggests the household has not participated in the financial market. FL_i represents financial knowledge, the core variable in this paper. X_i means the control variable, covering characteristics of families, householders, and provinces; μ_i symbolizes the random error $\mu_i \sim N(0, \sigma^2)$. α, β, γ, is a coefficient estimate vector. We give special attention to $\hat{\beta}$, the estimated value of the coefficient β. If $\hat{\beta}$ is significantly positive, it means that financial knowledge can promote participation by rural households in the financial market.

In this paper, we use the proportion of risky financial assets in the total amount of financial assets held by rural households to measure the depth of their participation in the financial market. Since the proportion of risky assets in financial assets held by rural households is a type of truncated data, the tobit model is used for empirical analysis.

$$\begin{cases} Y_i = \max(0, y_i^*) \\ y_i^* = \alpha + \beta FL_i + \gamma X_i + \mu_i \end{cases} \quad (2)$$

In this formula, Y_i is a variable representing the financial asset investment of rural households, measured by the proportion of risky financial assets; y_i^* means rural households with its proportion of risky financial assets falling between (0, 1). The meanings of other variables are consistent with those for the probit model.

Ivprobit model and ivtobit model.

The amount of financial knowledge in model (1) and model (2) may be ascribed to endogenous causes. On the one hand, it is up to rural households to decide whether to learn financial knowledge, meaning that their decisions might be affected by unobservable factors (such as local customs, culture, and social and historical reasons). These affect not only rural households' decisions to learn financial knowledge, but also their selection of financial assets. On the other hand, there may be reverse causality between financial knowledge and rural households' participation in the financial markets, as they do not necessarily invest in financial assets only after they have acquired some financial

knowledge. They are more likely to learn and accumulate financial knowledge as they delve deeper into the financial markets, and this reverse causality may lead to simultaneity bias and cause rural households to overestimate the impact of financial knowledge. Finally, there may be some deviations in the measurement of financial literacy indicators, and the answers provided by households in the sample to financial knowledge-related questions may be inaccurate or based on guesswork. To overcome the impact of the above endogenous problems and identify the causal relationship between financial knowledge and financial investment of rural households, financial knowledge variables are constructed according to data from the 2015 CHFS, and instrumental variables are selected to be estimated by ivprobit and ivtobit models.

Drawing on the ideas of Yin Zhichao et al. (2014), we select the average education level of respondents' parents as the instrumental variable after different instrumental variables are tested.[①] The effectiveness of the instrumental variables selected for our analysis is reflected in two aspects: First of all, parents are the earliest teachers of children, and family is also where one is exposed to financial knowledge. More well-educated parents can provide their children with earlier and easier access to financial knowledge. This sort of education will allow their children to gain a deeper understanding of financial concepts, such as interest rate calculations, inflation impacts, and risk-return relationships. Therefore, there is a correlation between the average education level of the respondents' parents and the financial knowledge level of the respondents themselves. Second, financial transactions are subject to the decisions of financial market participants. The educational level of their parents will not affect the financial investment behaviors of respondents directly, but indirectly by exerting an effect on financial literacy of their children. In the following section, the normative econometric test we use to determine the effectiveness of our instrumental variables is discussed.

Variable Selection

Explained variable.

According to the financial asset information collected by the 2017 CHFS, the existing research methods (Yin Zhichao et al., 2014; Wang Yang, 2019) should continue to be used to divide financial assets into risky financial assets and risk-free financial assets. The former includes stocks, funds, financial bonds, corporate bonds, financial derivatives, financial products, foreign reserves, and gold. The latter includes cash, cash in stock accounts, government bonds, demand deposits, and fixed-

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① A question was included into three rounds of CHFS conducted in 2013, 2015, and 2017: "What is the education level of your parents?" For this question, the respondents had to choose one of the following answers: a. Haven't received any form of education b. Elementary school c. Junior Secondary School d. Senior Secondary School e. Technical secondary school/vocational high school f. Junior college/higher vocational college g. Bachelor's Degree h. Master's degree 9. Doctoral degree. According to answers of respondents, we can identify the educational level of their parents. In the 2013 CHFS, all households gave their answers to this question. However, in the 2015 CHFS and 2017 CHFS, these households were not followed up and only new households answered this question. As a result, when constructing instrumental variables, we had to regard the educational level of the parents of respondents in the 2103 CHFS as the educational level of those who were not followed up in the 2015 CHFS and 2017 CHFS.

term deposits. The breadth of rural households' participation in the financial market is measured by a proxy indicator that represents whether rural households hold risky financial assets. If they hold risky financial assets, the indicator equals to 1. Otherwise, the value is 0. The depth of participation in the financial market is measured by a proxy indicator that indicates the proportion of risky financial assets in the total amount of financial assets held by rural households.

Financial knowledge indicator.

In light of the practices of existing literature, the financial knowledge level of rural households is measured by their ability to calculate interest rates, understand inflation, and identify risks. Specifically, in the 2015 CHFS, a question was devised to test their ability to calculate interest rates: If you deposit RMB100 in a fixed deposit scheme for five years, how much principal plus interest can you receive under an annual interest rate of four percent after five years? The possible answers are: a. Less than RMB120; b. RMB120; c. More than RMB120; d. Unable to calculate it. If the answer is "b. RMB120," the respondent is considered to have given a correct answer. If the answer is "a. Less than RMB120" or "c. More than RMB120," the respondent is believed to have provided an incorrect answer. A respondent who chose "d. Unable to calculate it" is seen as unable to calculate interest.

The question designed to evaluate the understanding of inflation is: If you deposit RMB100 in a bank for one year, how much worth of products can you buy with this RMB100 under an annual interest rate of five percent and inflation rate of three percent one year later? The potential answers include: a. More than a year ago; b. The same as a year ago; c. Less than a year ago; d. Unable to calculate it. If the answer is a. More than a year ago, the respondent is considered to have given a correct answer. If the answer is "b. The same as a year ago, or c. Less than a year ago," the respondent is believed to have provided an incorrect answer. A respondent who chose "d. Unable to calculate it" is seen as unable to calculate inflation rates.

The question for evaluating the ability to identify risks is: Which one do you think is riskier, stocks or funds? The options are: a. Stocks; b. Funds; c. Haven't heard of stocks; d. Haven't heard of funds; e. Haven't heard of both. If the answer is "a. Stocks," the respondent is considered to have given a correct answer. If the answer is "b. Funds," the respondent is believed to have provided an incorrect answer. If the answer is "c. Haven't heard of stocks" or "d. Haven't heard of fund" or "e. Haven't heard of both," the respondent is considered to have no idea what stocks or funds are.

Table 2 provides descriptive statistics about the above three questions devised to evaluate the command of financial knowledge by rural households. These three questions differ from each other in terms of accuracy of answers given by rural households. Unfortunately, only a small percentage of rural households are able to give correct answers. Specifically, only 15 percent correctly answer the question about inflation, while the figure for the question about the interest rate is 26 percent. Only 44 percent (still less than half) of rural households are capable of identifying risks. On top of these, a total of 51.7 percent, 49.23 percent, and 51.19 percent of rural families know nothing about interest rates, inflation, and risks, which is staggering.

Table 3 gives a description of the number of correctly-answered questions. As shown in the Table, only 2.01 percent of all households give correct answers to all three questions and these households only answer an average of 0.54 questions correctly. One particular note is that 47 percent of all rural families have no idea about these three questions of financial knowledge. The descriptive results of Table 2 and Table 3 indicate that rural families lack basic understanding of basic financial knowledge, a phenomenon that will inevitably have a bad influence on their financial investment behaviors.

Table 2　Descriptive Statistics of the Performance of Rural Households in Answering Questions about Financial Literacy

Indicator	Households Giving A Correct Answer	Households Giving A Wrong Answer	Households Unable to Give An Answer
Question About Interest Rate Calculation	26.42%	21.88%	51.70%
Question About Inflation	15.29%	35.48%	49.23%
Question About Risk Identification	44.47%	4.34%	51.19%

Table 3　Performance of Rural Households in Answering Questions about Financial Literacy

Results	0	1	2	3	Average
Households Giving A Correct Answer	60.01%	27.51%	10.47%	2.01%	0.54
Households Giving A Wrong Answer	66.37%	23.22%	9.96%	0.45%	0.44
Households Unable to Give An Answer	13.55%	19.02%	20.26%	47.17%	2.01

With reference to existing literature (Agarwal S.et al. 2010; Lusardi A.et al., 2010; Rooij et al., 2011; lusardi and mitchell, 2010; Yin Zhichao, 2014), the method of factor analysis is first employed to build financial knowledge indicators in this paper. Two virtual variables are defined according to rural households' answers of financial knowledge on each question. The first virtual variable is designed to signify whether the question had been correctly answered. If the answer is correct, the variable equals 1; otherwise it is 0. The second virtual variable is devised to represent whether the question had been answered directly (no matter the answer is correct or wrong).[1] If the question is directly answered, it equals 1; otherwise it is 0. Maximum likelihood method was used to conduct factor analysis on the six virtual variables arising from these three questions.[2] Table 4 provides descriptive statistical results of the financial knowledge level of rural households obtained through the factor analysis.

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[1] The respondents could only give three different types of answers to each question: a correct answer; a wrong answer; unable to give an answer. These three answers suggest a declining financial knowledge level. For example, rural households who gave a wrong answer have better financial literacy than those unable to give an answer. If only a virtual variable representing whether an answer is correct or wrong is involved, the financial knowledge level of rural households who gave a wrong answer would be mistakenly deemed equivalent to that of those unable to give an answer. This will give rise to deviations in the measurements of financial knowledge indicators.

[2] Results of Kaiser-Meyer-Olkin (KMO) test reveal that factor analysis is appropriate for this study. Considering that the characteristic value should be equal to or more than 1, one factor is retained. Due to length limitation, results of KMO test and factor analysis are not listed.

Table 4   Factor Analysis Results

Variable Name	Observed Value	Average	Standard Deviation	Minimum	Maximum
Financial Knowledge	9680	-0.303	0.594	-0.987	1.093

Additionally, in the subsequent robustness test for this paper, two indicators signifying the number of questions correctly answered by rural households[①] and their attention to financial knowledge will be employed to re-measure the level of financial knowledge, and conduct robustness test on the estimated results.

Capability against risks.

For our study, the capabilities of rural households against risks are measured from both subjective and objective perspectives. Subjective capability against risks is measured in view of a question about attitudes of the interviewed families towards subjective risks in the 2015 CHFS. This question is: If you have an asset, which one of the following types of investment projects will you choose? These projects include: a. Investment projects with the highest risks and highest returns; b. Investment projects with slightly higher risk and slightly higher returns; c. Investment projects with average risks and average returns; d. Investment projects with slightly lower risks and slightly lower returns; e. Unwilling to take any risks. If a rural household chooses "d. Investment projects with slightly lower risks and slightly lower returns" or "e. Unwilling to take any risks," the value for its subjective capability against risk shall be 0; if its answer is "c. Investment projects with average risks and average returns," the value shall be "a. If a rural household chooses 1. Investment projects with the highest risks" and highest returns or "b. Investment projects with slightly higher risks and slightly higher returns," the value for its subjective capability against risk shall be "b. A higher value means greater subjective capability against risks."

With respect to objective capability against risks, indicators for objective risk management abilities of rural households are established in view of a question about the pension scheme of the interviewed families[②] in the 2015 CHFS with reference to the methods of Yin Zhichao et al. (2020). Specifically, the rural households are asked, "Do you have a pension plan," and there are two options for this question: a. Yes; b. No. For families with pension schemes, they would be asked for more details of their plan. There are seven options for this question: a. Personal savings and investment; b. Child support; c. Social endowment insurance; d. Retirement pension; e. Commercial endowment insurance; f. Support from spouse or relatives; g. Other methods. If a household does not have a pension scheme, the value for its objective capability against risk is 0. If it chooses "b. Child support; d. Retirement pension; f. Support from spouse or relatives, or g. Other methods, it is deemed to have a

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[①] The corresponding question in questionnaire is: How much are you concerned about the economy and financial information? a. Deeply concerned; b. Very concerned; c. Concerned; d. A little concerned; e. Never concerned. Each of these options are given a value, namely 4, 3, 2, 1 and 0 respectively.

[②] Since the above questions were not retained in the 2017 CHFS, and the pension schemes of the households remain relatively stable, there were no significant changes between the two rounds of CHFS in 2015 and 2017. Therefore, the pension schemes for households in the 2015 CHFS are used for households followed up in 2017.

weak capability against risks and the value would be a. If a household selects "a. Personal savings and investment, c. Social endowment insurance, or e. Commercial endowment insurance," it is believed to have a strong capability against risks and the value would be b.

Other Control Variables

Control variables are selected according to the characteristics of different households, householders, and provinces.

Household characteristic variable.

Total household income includes income from agricultural production and operation, wage, property income, and transfer income. Household net asset means the total household assets minus household liabilities and household financial assets. To determine whether a household had any industrial and commercial business, a question is designed in the 2017 CHFS: Is your household now engaged in any industrial and commercial businesses, including self-employed and leasing businesses, transportation projects, online stores, and enterprises? If a respondent answers yes, the value for his/her net assets is 1; otherwise it is 0. If the respondent has a house, the value for homeownership is 1; otherwise, it is 0. In addition, the number of all immediate siblings of the householder and his spouse is used to measure the social network of the household. Family scale means the number of people living together in a rural household according to the CHFS definition of family members.

Householder characteristic variable.

The age of the householder is obtained by subtracting the year of birth of the householder given in CHFS data from 2017. Considering the nonlinear effect of age on the householders' credit behavior, the square of the age of the householder is added to the regression model. There are nine levels for the education of householders in the CHFS: a. Haven't received any form of education; b. Elementary school; c. Junior Secondary School; d. Senior Secondary School; e. Technical secondary school/vocational high school; f. Junior College/higher vocational college; g. Bachelor's Degree; h. Master's degree; i. Doctoral degree. The years of education corresponding to these options are 0, 6, 9, 12, 13, 15, 16, 19 and 22 years, respectively. The question in CHFS to measure the health status of the householder is: "How is your health compared to your peers? There are five corresponding options for this question: a. Very good; b. Good; c. Average; d. Poor; e. Very Poor. If a householder chooses a and b, the dummy variable for physical health is 1, and if he/she chose c, d, or e, the value is 0. If the householder is male, the value for gender is 1; otherwise, the value is 0. If householder is married, the value for marriage status is 1; otherwise, it is 0.

Provincial dummy variables.

Provinces in China differ greatly from each other in terms of socioeconomic status, financial market conditions, culture, and customs. Considering this regional heterogeneity, a provincial dummy variable is constructed to control for external environmental factors that affect rural households' participation in the financial markets.

Table 5 provides a description of the descriptive statistics of the variables. As shown in the

table, the percentage of rural households participating in the financial markets is only 13 percent, and the proportion of risky financial assets in total financial assets held by rural households is only 6.68 percent. Only six percent of rural households believe that they have a strong ability to resist risks, and only eight percent of rural households are confident in their ability to cope with risks. This shows that both the breadth and depth of rural households' participation in the financial market are inadequate, and their subjective and objective capabilities against risks generally prove to be insufficient. The average value for financial knowledge of rural households obtained through factor analysis is -0.3, the minimum value is -0.99, and the maximum value is 1.09. There are obvious differences in the level of financial knowledge among different rural households. In our sample, eight percent of rural households choose to start their own business in the industrial and commercial sectors; these rural households have four family members on average; the average age of householders is 57 years old, indicating that the population is aging in rural areas. The householders have received only a seven-year education on average, equal to the education level of Junior Secondary School, meaning that most of them are not well-educated. Also, more than a quarter of the householders are in poor health.

Table 5　Descriptive Statistics of Variables

Variable Name	Observed value	Average	Standard Deviation	Minimum	Maximum
Participation in Financial Markets	9680	0.13	0.34	0	1
Proportion of Risky Assets	8813	6.68	20.18	0	100
Financial Knowledge (Factor Analysis)	9680	-0.30	0.59	-0.99	1.09
Number of Questions Answered Correctly	9680	0.54	0.76	0	3
Attention Paid to Financial Information	9680	0.86	1.05	0	4
Strong Subjective Capability Against Risks	9680	0.29	0.59	0	2
Strong Objective Capability Against Risks	9680	0.43	0.63	0	2
Household Income (ten thousand yuan)	9680	4.09	4.79	-0.54	34.61
Family Net Asset (ten thousand yuan)	9680	28.25	39.39	0.09	292.40
Industrial and Commercial Businesses	9680	0.08	0.28	0	1
home ownership	9680	0.96	0.20	0	1
Number of Siblings	9680	0.43	1.46	0	17
Family Scale	9680	3.55	1.75	1	15
Age of Householder	9680	57.10	12.07	18	92
Gender of Householder	9680	0.89	0.31	0	1
Years of Education of the Householder	9678	7.00	3.44	0	16
Marital Status of the Householder	9680	0.88	0.33	0	1
Householders' Health Status	9680	0.28	0.45	0	1

Empirical Analysis

Financial Knowledge and Participation in the Financial Markets

Regarding financial market participation, and financial asset selection, we first examine whether financial knowledge significantly affects rural households' willingness to participate in financial markets according to previous definitions of financial knowledge, financial market participation, and financial asset selection. Column (l) in Table 6 is the estimated results of the probit model. After household characteristic variables, the householder characteristic variable, and the provincial dummy variables are controlled for, we find that financial knowledge has a significant positive impact on rural households' willingness to participate in the financial markets, generating a marginal effect of 0.016, which is statistically significant at the one percent significance level.

In addition, both household income and household net assets have a significant positive effect on rural households' participation in the financial markets, as increased income and assets enable them to pay the fixed costs of financial investments, and they are thus more willing to participate in the financial markets (He Wei & Wang Xiaohua, 2021). Being a self-employed business owner will have an effect on reducing the probability of participating in the financial markets. This generates a marginal effect of -0.054, and the effect is statistically significant at the 1 percent significance level. On the one hand, rural households who are self-employed business owners were already facing high risks, and they would therefore reduce their investments in the financial markets (Healton & Lucas; Yin Zhichao et al., 2014). On the other hand, they also faced more credit constraints that inhibited their ability to invest in financial assets, further reducing their willingness to participate in financial markets (Constantinides et al., 2002). Home ownership would reduce the probability of rural household's participating in the financial market, which was consistent with the conclusion in the literature that home ownership will "crowd out" investments in risky assets (Cocco, 2005; Wu Weixing & Qi Tianxiang, 2007). The scale of social networks, which is the number of brothers and sisters, would promote rural households' participation in risky financial markets. In a traditional and isolated "rural society," social networks can act as insurance that could improve households' capability against risks, thus contributing to their participation in financial markets (Yang Hong & Zhang Ke, 2021). Households with more family members would be less likely to invest in financial markets, as they must cope with a larger family expenditure. Therefore, they may face greater financial constraints on financial asset investments, thereby reducing their willingness to participate in financial markets (Wang Yang, 2019).

The age of the householder is in a nonlinear relationship with financial market participation because increased age will first increase and then diminish the possibility of rural households participating in the stock market. The marginal effect of years of education is 0.004, having a positive impact on financial market participation at the one percent significance level. Better-

educated rural households may find it easier to learn and master financial investment knowledge. This could encourage them to participate in financial investments (Vissing -Jorgensen, 2002). Rural households are more likely to participate in the financial markets, while those with the householder married and with a member in bad health are more reluctant to participate in the financial markets. The gender of the householder has no significant effect on financial market participation.

Of particular note, estimated results in Column (1) of Table 6 might be affected by endogenous bias, and there might be bias in the estimated coefficient for financial knowledge. To solve this problem, the average education level of respondents' parents is used as an instrumental variable of financial knowledge to conduct estimations in two stages. Column (2) is the estimated result of the ivprobit model after the instrumental variable is added. In the Wald test, the hypothesis that "financial knowledge" is an exogenous variable at the 5 percent significance level is rejected. In the first-stage estimation, the t value of the instrumental variable is 9.88. The value of the F-statistics is 35.06, greater than the critical value of 16.38 at the 10 percent bias level (Stock & Yogo, 2005). This indicates that there is no weak instrumental variable. In view of the above explanations of the exogenous problems of the instrumental variable, we believe that it is effective to select the average educational level of parents as the instrumental variable of financial knowledge in this paper.

The estimated results in column (2) show that the marginal effect of financial knowledge is 0.121, statistically significant at the 5 percent level. The estimated results of other variables are consistent with those in column (1). After the endogenous problem is taken into consideration, estimated results in the latter two stages further demonstrate that improvements in financial knowledge can increase the probability of rural households participating in risky financial markets. This verifies hypothesis H1.

Table 6　The Impact of Financial Literacy on Financial Market Participation and Financial Asset Selection by Rural Households

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	probit	ivprobit	tobit	ivtobit
Financial Literacy	0.016*** (0.005)	0.121** (0.054)	0.769** (0.319)	6.670** (3.228)
Ln (total income)	0.045*** (0.005)	0.041*** (0.006)	2.248*** (0.281)	2.016*** (0.327)
Ln (net asset)	0.043*** (0.003)	0.039*** 0.004	2.469*** (0.187)	2.203*** (0.222)
Industrial and Commercial Businesses	-0.054*** (0.010)	-0.048*** (0.010)	-2.865*** (0.564)	-2.543*** (0.575)
Home-ownership	-0.077*** (0.019)	-0.068*** (0.019)	-4.214*** (1.128)	-3.669*** (1.144)
Number of Siblings	0.014*** (0.002)	0.012*** (0.002)	0.740*** (0.129)	0.634*** (0.141)
Family Scale	-0.008*** (0.002)	-0.008*** (0.002)	-0.433*** (0.131)	-0.383*** (0.134)
Age	0.007*** (0.002)	0.007*** (0.002)	0.448*** (0.139)	0.439*** (0.138)
Square of Age	-0.008*** (0.002)	-0.008*** (0.002)	-0.511*** (0.125)	-0.478*** (0.124)

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	probit	ivprobit	tobit	ivtobit
Gender	0.005	0.005	0.549	0.553
	(0.012)	(0.012)	(0.709)	(0.718)
Years of Education	0.004***	0.001	0.176***	0.133***
	(0.001)	(0.002)	(0.068)	(0.051)
Marital Status of the Householder	-0.029**	-0.029**	-2.078***	-2.139***
	(0.012)	(0.012)	(0.691)	(0.694)
Health Status	-0.017**	-0.013**	-0.620	-0.435
	(0.008)	(0.006)	(0.493)	(0.512)
Provincial Dummy Variable	Controlled	Controlled	Controlled	Controlled
Observed Value	9680	9680	8813	8813
pseudo R²	0.160	0.161	0.132	0.133
t Value of the Instrumental Variable	—	9.88***	—	9.17***
f Value of the First Stage	—	35.06***	—	32.41***
Wald Test	—	3.83**	—	3.70**

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the clustered heteroskedastic-robust standard errors.

Financial Knowledge and Rural Households' Selection of Financial Assets

In the benchmark regression model in column (3) of Table 6, endogenous problems are not considered. The proportion of risky financial assets is regressed on financial knowledge according to the tobit model. After endogenous problems of financial knowledge are considered in column (4), the ivtobit model is used to estimate results in two stages. The hypothesis that "financial knowledge" is an exogenous variable is rejected in the Wald test at the 5 percent significance level, indicating that there are endogenous problems resulting from financial knowledge. Therefore, there is an endogenous bias in the benchmark regression results in column (3). In the first-stage estimation, the t value of the instrumental variable is 9.17. The value of the F-statistics is 32.41, greater than the critical value of 16.38 at the 10 percent bias level (Stock & Yogo, 2005). This indicates that there is no weak instrumental variable.

The estimated results of the ivtobit model in column (4) prove that the marginal effect of financial knowledge is 6.670, statistically significant at the 5 percent significance level. This finding shows that rural households with a better command of financial knowledge will change the structure of their financial assets by purchasing more risky financial products. Therefore, hypothesis H2 is verified.

In addition, increased income and assets will allow rural households to invest more in risky financial assets. Home ownership and being self-employed business owners will leave rural households with less money to invest in risky financial assets, while an expanded social network will serve to raise the proportion of their investment in risky financial assets. The influence of the age of the householder also displays a non-linear relationship, and more well-educated rural households tend to invest more in risky assets.

The Impact of Capability Against Risks on Financial Market Participation and Financial Asset Selection by Rural Households

Columns (1) and (2) in Table 7 report the effects of subjective and objective capabilities against risks on the breadth of participation by rural families in financial markets, respectively. Specifically, column (1) contains the estimated results of the probit model. Given the possible endogenous problems of financial knowledge, column (2) gives the estimated results of the ivprobit model in two stages. The results of the endogeneity test reveal that financial knowledge will lead to endogenous problems, and there are endogenous biases in the estimated results in column (1). As a result, the results in column (2) are reliable. For column (2), when the impact of financial knowledge is controlled for, we find that the marginal effect of subjective capability against risks is 0.03, a figure statistically significant at the 5 percent level. The marginal effect of the objective capability against risks is 0.05, statistically significant at the 1 percent level. Thus, stronger subjective and objective capabilities against risks can also motivate rural households to participate in risky financial markets.

Columns (3) and (4) in Table 7 report the effects of subjective and objective capabilities against risks on the depth of participation by rural families in the financial markets, respectively. Column (3) contains the estimated results of the tobit model. The estimated results of the ivtobit model in column (4) show that financial knowledge also has endogenous problems. This means that the results of column (4) are more credible. As for column (4), after the impact of financial knowledge is controlled for, enhanced subjective capabilities against risks can encourage rural households to hold risky financial assets.

According to the estimated results in Table 7, we conclude that increased subjective and objective capabilities against risks can expand the breadth and depth of rural households' participation in risky financial markets. Therefore, Hypothesis H3 is validated.

Table 7   The Impact of Capabilities against Risks on Financial Markets Participation and Financial Asset Selection by Rural Households

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	probit	ivprobit	tobit	ivtobit
Strong Subjective Capability Against Risks	0.031** (0.013)	0.050*** (0.017)	1.029** (0.464)	2.180** (0.982)
Strong Objective Capability Against Risks	0.030*** (0.011)	0.024** (0.012)	1.666*** (0.646)	1.251* (0.689)
Financial Knowledge	0.016*** (0.005)	0.119** (0.054)	0.733** (0.319)	6.596** (3.241)
Other Control Variables	Controlled	Controlled	Controlled	Controlled
Observed Value	9680	9680	8813	8813
pseudo R²	0.161	0.162	0.133	0.133
t Value of the Instrumental Variable	—	9.29***	—	9.29***
f Value of the First Stage	—	39.43***	—	39.43***
Wald Test	—	3.82**	—	3.69**

Note: *, **, and *** indicate the impact is statistically significant at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the cluster-heteroskedastic-robust standard errors.

Analysis of Impact Mechanisms

Table 8 tests whether financial knowledge can affect rural households' financial investment decisions by influencing their subjective and objective capabilities against risks. The estimated results reveal that improved financial knowledge levels of rural households will lead to stronger subjective and objective abilities against risks. This relationship suggests that financial literacy can expand the breadth and depth of rural households' participation in the financial markets by changing their subjective and objective capabilities against risks. As a result, Hypothesis H4 proves to be true.

Table 8　Analysis of Impact Mechanisms

	Strong Subjective Capability Against Risks	Strong Objective Capability Against Risks
	(1)	(2)
	OLS	OLS
Financial Knowledge	0.154*** (0.011)	0.047*** (0.012)
Other Control Variables	Controlled	Controlled
Observed Value	9680	9680
$Adj.R^2$	0.113	0.136

Note: *, **, and *** indicate the impact is statistically significant at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the cluster-heteroskedastic-robust standard errors.

Robustness Test

To examine the robustness of the empirical results in this paper, indicators for the financial knowledge levels of rural households need to be re-measured. To this end, we first use the number of correctly answered financial knowledge questions to measure the comprehensive financial knowledge levels of rural households. Rural households to give more correct answers are more efficient in comprehensively applying financial knowledge. Second, we measure the level of financial knowledge by looking at how much attention the interviewed households have been paying to economic and financial information, as rural households more concerned with such information generally have easier access to financial knowledge.

Table 9 shows the results of the robustness test conducted by re-estimating the above models according to the two newly defined financial knowledge indicators. As demonstrated in columns (1) - (2), higher comprehensive and general financial knowledge levels will significantly improve the willingness of rural households to participate in financial markets. Columns (3) - (4) also suggest that a higher financial knowledge level can significantly increase the proportion of rural households' investments in risky financial assets, whether the proxy variable is the attention paid to financial information or the number of financial knowledge questions correctly answered.

Table 10 describes the robustness test on the impact of capabilities against risks on the breadth and depth of rural households' financial market participation. The estimated results in columns (1) - (4)

indicate that regardless of the level of financial knowledge, both subjective and objective capabilities against risks are important factors affecting rural households' willingness to participate in financial markets and their selection of financial assets. Rural households with higher subjective and objective capabilities against risks are more likely to participate in the financial markets and tend to invest a larger percentage of their wealth in risky financial assets.

Table 11 illustrates the robustness test of the impact mechanism. Columns (1) and (3) correspond to estimated results of comprehensive financial knowledge. As they accumulate more comprehensive financial knowledge, farmers can better evaluate their capabilities against risks and handle risks more efficiently. Columns (2) and (4) are estimated results of general financial knowledge, and they imply that financial knowledge can enhance rural households' subjective and objective capabilities against risks at the same time.

The empirical results of our analysis confirm that rural households with higher levels of financial knowledge and rural households with stronger capability against risks are more willing to participate in risky financial markets and invest more in risky financial assets, whether the estimated results are based on financial knowledge indicators in factor analysis or comprehensive and general financial knowledge indicators. The mechanisms analysis also reveal that financial knowledge can affect the breadth and depth of rural households' participation in the financial markets by exerting an effect on their subjective and objective capabilities against risks.

Table 9   Robustness Test—Financial Literacy

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	ivprobit	ivprobit	ivtobit	ivtobit
Number of Questions Answered Correctly	0.104** (0.046)	—	5.738** (2.777)	—
Attention Paid to Financial Information	—	0.120** (0.053)	—	6.593** (3.191)
Other Control Variables	Controlled	Controlled	Controlled	Controlled
Observed Value	9680	9680	8813	8813
pseudo R^2	0.161	0.161	0.1330	0.133
t Value of the Instrumental Variable	8.372***	5.143***	8.369***	5.138***
f Value of the First Stage	27.462***	18.531***	27.459***	18.527***
Wald Test	4.05**	4.08**	3.91**	3.85**

Note: *, **, and *** indicate the impact is statistically significant at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the cluster-heteroskedastic-robust standard errors.

Table 10   Robustness Test—Capability Against Risks

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	ivprobit	ivprobit	ivtobit	ivtobit
Number of Questions Answered Correctly	0.103** (0.046)	—	5.674** (2.789)	—

	Financial Market Participation		Financial Asset Selection	
	(1)	(2)	(3)	(4)
	ivprobit	ivprobit	ivtobit	ivtobit
Attention Paid to Financial Information	—	0.118** (0.054)	—	6.554** 3.221
Strong Subjective Capability Against Risks	0.052*** (0.017)	0.082*** (0.028)	2.222** (0.995)	3.880** 1.642
Strong Objective Capability Against Risks	0.024** (0.012)	0.013** (0.007)	1.248** (0.612)	0.644** (0.319)
Other Control Variables	Controlled	Controlled	Controlled	Controlled
Observed Value	9680	9680	8813	8813
pseudo R^2	0.162	0.162	0.133	0.133
t Value of the Instrumental Variable	8.35***	5.11***	8.35***	5.11***
f Value of the First Stage	27.22***	18.58***	27.22***	18.58***
Wald Test	3.91**	3.95**	3.82**	3.76**

Note: *, **, and *** indicate the impact is statistically significant at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the cluster-heteroskedastic-robust standard errors.

Table 11　Robustness Test—Impact Mechanism

	Subjective Capability Against Risks		Objective Capabilities Against Risks	
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Number of Questions Answered Correctly	0.115*** (0.009)	—	0.038*** (0.009)	—
Attention Paid to Financial Information	—	0.099*** (0.007)	—	0.049*** (0.007)
Other Control Variables	Controlled	Controlled	Controlled	Controlled
Observed Value	9680	9680	9680	9680
Adj.R^2	0.113	0.113	0.136	0.147

Note: *, **, and *** indicate the impact is statistically significant at the 10%, 5%, and 1% significance level, respectively. These coefficients represent marginal effects. Inside the brackets are the cluster-heteroskedastic-robust standard errors.

Research Conclusions and Policy Implications

Based on the data on rural households collected in two rounds of the China Household Finance Survey, in 2015 and 2017, we study the impact of financial literacy and capacity against risks on participation by rural households in risky financial markets and their selection of financial assets. To offset the effects of estimation bias arising from endogenous problems of financial knowledge, we use a two-stage instrumental variable method to estimate results based on the ivprobit model and the ivtobit model.

We find that financial knowledge and capability against risks are the two key factors in understanding the financial asset selection behaviors of rural households. The more financial knowledge they have and the stronger their ability to guard against risks, the more likely they are to

participate in financial markets and the more they will invest in risky financial assets. Our mechanism analysis further shows that higher financial knowledge levels can help rural households evaluate their capabilities against risks and ramp up their ability to deal with risks, thus indirectly expanding the breadth and depth of participation in financial markets. We discover that after multiple dimensions of indicators are employed to measure financial knowledge, the estimated results remain stable. In addition, increased household income and wealth, and a larger social network help rural households to participate and invest in the financial markets. By comparison, factors, such as home ownership, being a self-employed business owner, and increasing family size, will "squeeze" the breadth and depth of rural households' participation in the financial markets. The education level and health status of householders have a significant positive effect on financial investments. Age shows a nonlinear relationship with financial investments, which increases first and then decreases as the age of the householders' increases.

Based on the above conclusions, we believe that the lack of financial knowledge is a "stumbling block" restricting rural households from participating in financial markets and investing in risky financial assets. An inadequate command of financial knowledge is also a bottleneck hampering the growth of their property income. In rural areas, most rural families are poorly educated, and they generally have little access to financial knowledge. This leads them to misunderstand and resist financial products. According to the 2017 CHFS data, 75.46 percent of rural households did not participate in the stock market because of "a lack of knowledge about stock trading," and 65.52 percent of rural households did not enter the fund market because of "a lack of knowledge about funds." After mastering basic financial knowledge, rural households are likely to change their current financial investment decisions.

Therefore, when formulating policies and measures to boost the enthusiasm of rural households to engage in the financial markets, emphasis should be put not only on financial hardware infrastructure, but also on enhancing the financial literacy of rural households. There are a few ways to achieve this purpose. First, relevant government departments should dispatch personnel to spread financial knowledge in rural areas, and help rural households better understand financial knowledge by organizing outreach and online courses and free training sessions. Second, financial institutions can also regularly visit rural households to train target families in financial investments. This would allow financial institutions to interact with rural households and determine their personalized financial needs. Third, information technologies and new self-media platforms such as WeChat and Weibo can be harnessed to expand channels for rural households to acquire financial knowledge, and regularly feed simple and practical popular financial knowledge or financial cases to rural households to nurture their interests in increasing their financial knowledge. Finally, apart from disseminating financial knowledge, rural households should also be encouraged to put what they have learned into use. For this purpose, rural communities and financial institutions can offer corresponding opportunities and scenarios to help put the financial knowledge rural households have learned into practice, and thus assist them in transforming financial knowledge into intrinsic financial literacy.

These efforts will motivate rural households to invest in financial markets on the demand side, thus preserving or increasing their wealth and raising their property income.

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A Preliminary Study of Embedded Supervision Thoughts: Based on a Distributed Financial System

Wu Xiangyi, Du Kunlun, Tang Zhou, and Li Xianbin*

Sichuan Academy of Social Sciences

Abstract: Regulation of technology has been a hot issue in the financial field in recent years. Traditional financial regulation is constructed by a centralized account system, which relies on ex-ante regulation. Embedded supervision, which relies on regulation during and after the matter, operates in a decentralized and trusted environment and has the characteristics of high efficiency, transparency, and safety. It provides a breakthrough to solve the lag of traditional financial supervision. This paper clarifies the concepts and theoretical basis of embedded supervision, constructs the embedded supervision model with a lag, and analyzes the feasibility of embedded supervision with a lag. This research can promote scientific exploration and method innovations in the domestic finance field, enrich China's financial discipline system, and provide decision-making references for practical financial supervision innovation.

Keywords: blockchain, embedded supervision, distributed financial system

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*   Wu Xiangyi, Institute of Finance and Trade, Sichuan Academy of Social Sciences;
     Tang Zhou, Institute of Finance and Trade, Sichuan Academy of Social Sciences;
     Du Kunlun, Institute of Finance and Trade, Sichuan Academy of Social Sciences;
     Li Xianbin, Institute of Finance and Trade, Sichuan Academy of Social Sciences.
     Correspondence concerning this article should be addressed to Wu Xiangyi, Institute of Finance and Trade, Sichuan Academy of Social Sciences, Chengdu. Email: wxiangyi@outlook.com

Overview of Blockchain Technology

Since Satoshi Nakamoto proposed the concept of blockchain in his *Bitcoin: A Peer-to-Peer Electronic Cash System* in 2008, blockchain, encrypted assets, and smart contracts have become hot research areas in academic fields and practice fields, which have penetrated many industries. There are four main trends in the development of blockchain, including new infrastructure, government affairs, supply chain, finance, and other sectors.

How to combine and implement blockchain technology with multiple fields has become the main direction of academic and practical exploration. In the beginning, blockchain technology was mainly used in the currency field, as it can make trading affairs more secure and convenient. Then blockchain technology gradually entered the financial field after Ethereum (Ethereum is a platform powered by blockchain technology that is best known for its native cryptocurrency, called Ether or ETH, or simply Ethereum) became the first public blockchain embedded in a Turing-complete programming language, when the concept of smart contracts was proposed (Ouyang et al., 2019). After that, blockchain technology gradually entered the financial field and the application of blockchain is mainly focused on "Blockchain + Bank" (Ba, 2020; Zhang, 2019; Hu et al., 2017). As for the research framework and basic theory of blockchain supervision, it is in its infancy, and there are still many problems and ideas to be demonstrated and solved. Current blockchain policy is mainly based on encouragement, and partially based on implementation, 80 percent of which are guiding policies, while regulatory filings accounted for just 7.6 percent. So, there is an urgent need to supplement and improve the regulations related to blockchain.

The *Guiding Opinions of the State Council on Strengthening and Standardizing the Interim and Ex-post Regulation* states that,[1] "Giving full play to the roles of modern technologies in the interim and ex-post regulation, promoting regulatory innovations by depending on such new technologies as the Internet, big data, the Internet of Things, cloud computing, AI, and blockchain, and making efforts to achieve maximum regulatory effectiveness, optimized regulatory costs, and minimum interference to market players."

Blockchain technology has been further developed and applied in the field of financial regulation, such as smart contracts and smart regulatory reports. Blockchain is seen as an adjunct rather than an alternative to existing regulations. For instance, one of the Financial Conduct Authority (FCA)'s[2] planned future projects, Blockchain Technology for Algorithmic Regulation and Compliance (BARAC), aims to investigate the potential use of blockchain technology for automated regulation and compliance. IBM has partnered with CLS Group, a foreign exchange market infrastructure company, to create a platform called Ledger Connect. Deloitte used blockchain technology to help

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① http://www.gov.cn/zhengce/content/2019-09/12/content_5429462.htm
② The Financial Conduct Authority (FCA), the UK's financial markets regulator.

Northern Ireland Bank integrate its business data onto the chain and establish a blockchain distributed financial report system. Blockchain technology establishes linkages among the bank's departments and realizes cross-bank supervision.

With the advent of blockchain, regulatory technology can fall into two categories, which refer to traditional regulatory technology and new regulatory technology. Traditional financial regulation mainly relies on pre-project approval and post-project regulation. But considering the institutional design and cost-effectiveness, the government is unable to do real-time supervision. So, with the financial products becoming increasingly complex and the transactions increasingly frequent, the existing problems and risks are gradually exposed and negative externalities to society are increasing (Feng, 2012). Embedded supervision is a kind of whole-process, full coverage supervision, before the event, at present, and after the event. Under embedded supervision, the regulatory process is no longer just running on the backend supervision system, but on the trading system. This means that every single transaction is monitored, at the time of trading.

The concept of embedded supervision is a comparatively novel concept; both domestic and foreign research on it mostly focus on its concept. An algorithm for embedded supervision is still being explored. How to use engineering thinking to learn the economic connotations and utility of embedded supervision is also an urgent problem and needs to be solved. In this paper, the model was optimized and deduced more accurately based on Raphael Auer (2019), and its technical feasibility was examined by combining the current situation with monitoring technologies. It also enriches the research content of embedded supervision.

Embedded Regulatory Literature Review

The embedding theory emerged in the middle and late 20th century and was then widely used in economics and sociology. The theory emphasized that "behavior and institutions are deeply conditioned by social relations." Therefore, it can be seen that even if the assumption of rational economic man is satisfied, rational economic behavior will be restricted by social relations. As a kind of social activity, economic behavior is embedded in various social relations and generates economic order. In a dialogue with Oliver E. Williamson (Nobel Prize Winner in Economics in 2009, majoring in New Institutional Economics), Mark Granovetter proposed "embedding," the core concept of new economic sociology (Granovetter, 2015) and Su Chunyan (2004) analyzed the embeddedness of the social construction of economic action. The application of embeddedness in the financial field can be divided into two levels: one is the application of embedded supervision in the field of centralized finance; the other is the application of embedded supervision in the field of distributed finance. Embedded supervision means automatically monitoring the issuance and trading of digital assets such as digital securities and cryptocurrencies for compliance with regulatory objectives by reading distributed ledgers, and reducing the need to proactively collect, verify and deliver data. Embedded supervision will further facilitate the compliant trading of digital assets and make decentralized

financial engineering possible by self-executing smart contracts.

Research on Centralized Financial Embedded Supervision

Taking the legal supervision of private lending as an example, Feng Hui (2012) discussed the concept of innovation and system application of "embedded supervision" in financial supervision. He proposed that the supervision of private lending should be guided by the embedded supervision concept, with equal emphasis on blocking and dredging, strict reform, and strict law enforcement to comprehensively improve the performance of the financial regulatory system from the perspectives of illegal borrowing in accordance with laws and regulations, risk warning and information supply, interest rate liberalization, and promotion of cooperative finance. Tang Hongxia (2014) put forward the idea of implementing embedded supervision on the operation of private capital, and suggested adopting embedded supervision of both dredging and blocking, establishing, and improving private financing and lending service platforms and credit guarantee mechanisms, dredging private investment financing channels, and timely disclosure of relevant information. He Haifeng (2018) and others proposed that regulatory technology should be applied to the entire chain of financial supervision, and that cooperation between the regulatory end and the compliance end will become the main path of regulatory technology. Blockchain technology is becoming an important part of regulatory technology, and the process of institutionalization of regulatory technology is accelerating. Yang Dong (2018) defines RegTech as a means of "technology-driven supervision." "Technology-driven supervision" refers to the two-dimensional supervision system formed by adding a technological dimension to the traditional financial supervision dimensions such as prudential supervision and behavior supervision under the current situation of disintermediation and decentralization of financial transactions. Xia Shiyuan et al. (2020) developed a preliminary outlook on the application of blockchain technology as a typical technology of regulatory technology.

However, the reasons why it is difficult to implement embedded supervision for centralized financial institutions are as follows: First, the interests of regulators and regulated parties differ substantially, and there is a lack of consensus on the implementation of embedded supervision; Second, the accounting system construction logic of centralized financial institutions is enclosed, and it is difficult for the supervisory methods to be embedded into the whole process of the business operation system. Only off-site and non-real-time supervision and punishment with per-object indicator settings, and post-project reports can be achieved.

Research on Distributed Financial Embedded Supervision Innovation

As artificial intelligence, big data, blockchain, and other high and new technologies continue to expand their influence on the traditional financial industry, the integration of fintech and financial business has been promoted to a great extent. At the same time, a new challenge to traditional financial supervision is posted. The risks posed by fintech are disruptive and insidious; therefore, the efficiency of financial supervision may be reduced if the regulatory ideas and methods are not

improved.

The Regulatory Sandbox, which originated in the UK, realized real-time, information-based, and panoramic supervision. In the supervision practice, the supervision effect should be investigated continuously and fully, and the supervision measures should be revised flexibly and improved according to the supervision effect (Wilkinson, 2007). In 2016, Aegean University proposed a plan to apply blockchain technology to financial markets, allowing simultaneous transactions and financial supervision. The Federal Reserve Bank of Boston (2019) proposed a design idea for the regulatory node architecture based on blockchain technology. The Federal Reserve and the Bank of England believe that distributed ledger technology can control financial risks not only by analyzing traditional financial statements but also by monitoring data through real-time supervision.

Raphael Auer (2019), chief economist of the Bank for International Settlements, built an innovative implementation of embedded supervision in blockchain finance. This article offers a regulatory framework for reading the distributed ledger information in the market and then analyzes the data to automatically monitor the compliance of the generalized market, thereby reducing the need and cost of passive collection, verification, and delivery of data by the regulated object. Ji Jia (2019) supposed that embedded supervision could simplify the audit procedures, reduce the fixed cost of establishing the regulatory system, and improve the efficiency of financial supervision. Ba Shusong et al. (2020) looked forward to blockchain-based financial supervision from the perspective of data-driven embedded supervision. Shusong's article focused on the potential risks brought by blockchain applications, analyzed how to use blockchain and other new technologies to strengthen financial supervision, and conducted theoretical explorations for improving blockchain supervision mechanisms. Douglas Arner et al. (2020) conducted research on the risks, potential, and regulation of stablecoins, and proposed that from a regulatory perspective, one possible option should be to embed regulatory requirements into the stable-coin system itself. Dirk A. Zetzcher et al. (2020) conducted an in-depth study of distributed finance in the context of traditional economics and finance and proposed that a brand-new regulatory design method, "embedded supervision" and "embedded regulation" be developed. The idea is to build the supervision method into the system of distributed finance and incorporate both finance and supervision into supervision technology. The financial regulation in the US mainly adopts functional regulation and classifies financial business with blockchain, big data, and other technologies. Li Xiaonan (2020) proposed that embedded regulation should be introduced based on the decentralized characteristics of blockchain technology itself. Li believes that access for regulators should be provided in blockchain financial infrastructure to allow them to supervise the safe operation of the system. Li put forward a feasible scheme: to set up a super-node in the blockchain as the regulatory node, which is able to meet micro and macro-prudential requirements and adapt to different regulatory requirements according to changing application scenarios. For instance, this node could be given the power to access and supervise financial transactions between different nodes in the blockchain. Wu Xiaoling (2021) also proposed a new construction method for the supervision of data and algorithms of platform financial technology (fintech) companies. Wu suggested that the behavior

supervision of algorithms be strengthened and a compliance audit framework for algorithms and the regulatory requirements be constructed, as well as embedding social ethics and anti-monopoly reviews into the behavior monitoring algorithm. Cheng Xuejun et al. (2021) conducted research on the operation mechanisms of regulatory technologies and recommended comprehensive solutions for efficient supervision, relying on cutting-edge technologies such as blockchain and artificial intelligence. He found that the regulation technology ecology is constructed by supervisors, financial institutions, and regulation technology companies, and the application of transaction behavior monitoring, customer identification, financial stress testing, submission of compliance data, and tracking of laws and regulations is widespread. In order to balance the dual goals of promoting the development of fintech and preventing financial risks, the concept of financial supervision needs to be changed.

However, the current limitations of research on distributed financial embedded supervision innovation center on two points: one is that most studies only give a conceptual framework; the other is that some studies give financial cases, but they lack systematic theoretical construction.

Embedded Supervision Model Building

According to the paper of Raphael Auer (2019), which establishes a general model for distributed markets, the difference lies in that the utility of each party is clearer and the calculation formula is corrected. This paper also optimizes results and the related parameters of embedded supervision with a lag.

Assumption

In a market under embedded supervision, participants are free to trade during the duration, and all contracts are forced to clear when they expire. The transaction process is verified by the verifiers, and the transaction can be added to the chain only after being verified. At the same time, the transaction information will be transferred to the supervisors, who have the right to view the information in real time. Under real-time embedded supervision, the supervision system will be continuously monitored, while under embedded supervision with a lag, regulatory measures are taken only "once in a while," which introduces the risk that losing parties among the market participants will have incentives to bribe the verifiers to reduce trading losses. The regulatory system must assess the risks of the transactions, and if it finds that there may be risks, in-depth risk research will be needed. If a significant risk is found, the transaction will undo the chain and the verifiers will be punished. According to the situations above, we put forward the following assumptions:

    a. Before the deal, participants must have enough margin in the distributed ledger to meet the potential net payoff of the contract on the chain, thereby avoiding settlement risk.

    b. Assume that the contracts are added to the blockchain at time $t=b_i=0$. And the service charge is only paid once, at the beginning of contract signing.

c. Participants know the set of verifiers for each block before they assign a transaction contract to the blockchain.

d. Rational economic assumption. The losing parties have an incentive to bribe the verifiers to revoke the block to cut a loss. If the verifiers receive a bribe greater than the sum of verification capital and commission income ($f + s$), the verifiers have an incentive to participate in a "blockchain history reversion" attack.

e. If two or more competitive blockchains emerge, market participants will only assign their blocks to the blockchain with the highest cumulative verification capital. This means that the chain is unique.

f. The verifiers verify the contracts of market participants to the chain only if the verification capital is high enough that the block will not be revoked.

g. Maximum contract loss within the extension is $\bar{C}_i = P_{i,0}\underline{c}$, part of the initial value of the contract.

The definition of these variables is shown in Table 1:

Table 1 Variable Definitions

Variable		Description
b, t	Block number, time	Time is discrete, and is indexed by t; b is normalized, so that t and b can represent each other
b_i	The block into which contract i is assigned	The set of contracts is indexed by i. b_i is added to the chain at time $t = b_i$
L	The length of the contract	Each contract expires after a period of L
$N_{i,t}$	The number of contracts live at time t	The number of contracts assigned at the beginning is $N_{i,0}$, $N_{i,t}$ contracts i are still live at time t
v_i	Number of verifiers	During the duration of contract i, the number of verifiers remains the same
s	Verification capital	In each block, each verifier is required to deposit a verification capital worth s
δ	Risk-free rate	Verifiers can validate the blocks, or they can invest their capital elsewhere to earn a return of δ
f	The verifier's commission	In each block, each verifier will receive a commission income f at the end of the contract
$\underline{\pi}$	Transaction rate	$\pi = \underline{\pi}P_0$
π	Service charges	Participants pay a charge at the beginning of the period
$C_{i,t}$	Profit loss ratio	The total profit and loss ratio at time t: $C_{i,t} \in [-\underline{c}, \underline{c}]$
$P_{i,t}$	The price of contract i at time t	
$r_{i,t}$	Supervision profit and loss ratio	The total profit and loss ratio of supervision at time t: $r_{i,t} \in [-\underline{r}, \underline{r}]$
D	The number of days of delay in regulation	

Simplified Model Construction

Three parties are involved in this model. Respectively, the supervisor's utility refers to U_R, the utility of financial market participants refers to U_c, and the utility of market verifiers can be expressed as U_v. The objective function is expressed as follows:

max $E(U_R + U_c + U_v)$

According to the specific situation of this paper, for supervisors, the revenue relates to the regulatory fees, which refers to $R_{i,t}$, usually negative. Then the utility of supervisors is represented as $U_R = -R_{i,t}$. While the contracts remain on the blockchain, contracts generate losses or gains. Martet participants are divided into the ones with losses or gains. The behaviors of the ones with a positive payoff can be predicted, as they are sure to be willing to sell off. But the losing side has incentives to bribe verifiers in order to minimize the loss, of which the greatest value is $C_{i,t}$. So, the utility of market participants can be represented as $U_c = -C_{i,t}$. The utility of verifiers is the sum of commissions and security deposits, which refers to $U_v = v_t L(v + f)$. The specific model is derived as follows:

In this model, time is discrete and indexed by t, and at each time period, a new block is added to the blockchain, labeled b. The number b is normalized so that b can be viewed as t. Assume that the current block number at time t_1 is b, block b_i was added to the chain at time $t_2 = b_i$, then $t_1 - t_2 = b - b_i$ corresponds to the time that has elapsed since block b_i was written into the blockchain.

In each block b, the set of newly generated contracts is represented as i, then the number of contracts on the block b_i at the beginning is $N_{i,0}$. Each contract has a buyer and a seller, and the participants of each contract pay a service charge and a settlement fee totaling π for the right to assign and clear a financial contract on the block.

When a financial contract i is assigned to block b_i, it generates a series of net gains or losses as the price of the asset fluctuates. These financial contracts can be considered as any type of financial transaction in which the future net gain or loss is uncertain. Contracts are zero-sum, where the changes in the losing side and the gains side are negative of each other, and the absolute values are equal.

Participants can freely enter and exit the market. And if they decide to exit the market, they can cash out of the market, that is, settle the contract with off-book funds: the negative balance party transfers the off-chain funds to the positive balance party, and then both parties dissolve the contract on the blockchain. All contracts in set will not be clear until $t - b_i = L$.

The verifier acts as a third party, assigning the block containing the new contract into the blockchain. The system randomly assigns enough verifiers to validate the contracts on the block, to perform customer identification, anti-money laundering, and other legal background checks. On each block, if the verifiers use their verification capital for block verification, they will earn verification income f at the end of the contract. But if the verifiers do not verify the block or invest the capital elsewhere instead, such as capital markets or money markets, they will get a return of δ at the expiration of the contract, which is the opportunity cost of the verifiers participating in the verification of the block. Once the verifier uses his verification capital to validate a block, his verification capital will be locked throughout the duration of the

contract for the period of L time. It cannot be withdrawn until the contract expires. If the verifier validates a block that is reversed at some time in the future, the verifier will suffer a loss.

On each block, we assume that the net loss parties to the contract can form an alliance. If the net loss party, or parties, wants to undo the gains and losses on the current block, which is to say that they want to co-fund the abolition of blocks on the blockchain, a certain amount of money is required to bribe the verifier. The verifiers will only suffer a financial loss, called verification capital s, when the blocks are found to be reversed afterwards.

To simplify the derivation, we assume that the number of contracts to be cleared each day over the life of the contract varies proportionally in the simplified model and in each block, there is a share $(1 - \beta)$ of contracts that are netted. Netting means to net on-chain positions via off-chain payments and then void the contract on the chain. Then we know that: $N_{i,t} - N_{i,t-1} = -(1-\beta)N_{i,t-1}$.

First of all, we define the cumulative rate of return of contract i at time point t ($t > b_i$) as $C_{i,t}$. There will be losses and gains while the contract is still on the blockchain, like stock accounts. The net present value of the profits and losses is distributed over time:

$$\begin{cases} c_{i,t}b_i \in \left[-\underline{c},\underline{c}\right], 0 < t < L \\ c_{i,t}b_i = 0, t \geq L \end{cases}$$

In the general model, the number of reductions in valid contracts is in a geometric sequence. Then the number of live contracts at the end of each period can be expressed as:

$$N_{i,t} = \begin{cases} \beta^t N_{i,m}, 0 \leq t \leq L \\ 0, t \geq L \end{cases}$$

The number of new contracts cleared per day is:

$$-\Delta N_{i,t} = (1-\beta) N_{i,t-1}, 0 < t \leq L$$

For the verifier's account, during the term of this contract $1 \leqslant t \leqslant L$, the validator needs to validate the contracts on each block at each time period. Set $N_{i,0} = N_m$, then we have:

$$v_i\left[s(1+\delta)^{L-1} + s(1+\delta)^{L-2} + \llcorner + s\right] = Lv_i(f+s)$$

$$N_m\pi(1+\delta)^L = Lv_i f$$

Obtained from the above equation, we can get:

$$f = s \cdot \left[\frac{(1+\delta)^L - 1}{L \cdot \delta} - 1\right]$$

Substitute the above equations into the formula for calculating the procedure rate $\underline{\pi} = \dfrac{\pi}{P_{i,0}}$, then we have:

$$\underline{\pi} = \frac{L v_i f}{N_m P_{i,0}}$$

An expansion of the service charge rate can be obtained in the general model:

$$\underline{\pi} = \frac{v_i s}{N_m P_{i,0}} \left[\frac{(1+\delta)^L - 1}{L \cdot \delta} - L \right]$$

The sufficient and necessary condition for the economic finality is: at the end of time point t, no strategy to undo the last $0 \sim X$ ($X < L$) blocks can ever be profitable, even under the most adverse realization of payoffs.

We use $C_{i,t}$ to denote the maximum gain $C_{i,t}$ of abolishing block $b_{i,t}$ in the chain at time t.

$$C_{i,t} = \beta N_{i,t} P_{i,0} \underline{c}, 0 < t < L$$

In the situation without supervision, the total utility function is $E(U_c + U_v)$. We can define it as economic finality, which can be expressed as:

$$E \left\{ \max_{X < L} \left\{ \sum_{k=0}^{X} \left[C_{i,t} - v_i (s + f) \right] \right\} \right\} \le 0$$

To satisfy the following conditions:

$$\overline{C_i} = \max_{0 < t < L} (C_{i,t}) = \max_{0 < t < L} (N_{i,t} P_{i,t-1} \underline{c})$$

The expanded form of $\overline{C_i}$ can be obtained in the general model:

$$\overline{C_i} = N_m P_{i,0} \underline{c}$$

Assertion 1: The necessary and sufficient conditions of the economic finality of the general model can be simplified as:

$$\overline{C_i} \le v_i L(s+f), \ 0 < t < L$$

So that:

$$\beta N_m P_{i,0} \underline{c} \le v_i L(s + f)$$

Proof:

For contracts generated at time point $b_{i,0} = t = 0$, as long as $0 < t < L$:

We know one of the necessary and not sufficient conditions for an economic finality is: it is unprofitable to abolish the current block $b_{i,t}$ of the chain at time t, that is:

$$N_{i,t}P_{i,0}\underline{c} - v_i L(s+f) \le 0, 0 < t < L$$

Then one of the necessary (but alone not sufficient) conditions needed for economic finality can be obtained: at time t, for $X < t$, it is uneconomical to abolish blocks $b_{i,t-X}$ to $b_{i,t}$ in the chain, because: when $0 < t < L$:

$$N_{i,t}P_{i,0}\underline{c} - v_i L(s+f)$$
$$\le \beta N_{i,m}P_{i,0}\underline{c} - v_i L(s+f)$$
$$= \overline{C}_i - v_i L(s+f) < 0$$

$$\left[N_{i,t}P_{i,0}\underline{c} - v_i L(s+f) \right] + \left[N_{i,t-1}P_{i,0}\underline{c} - v_i L(s+f) \right]$$
$$\le \left[\beta N_{i,t}P_{i,0}\underline{c} - v_i L(s+f) \right] + \left[\beta N_{i,t-1}P_{i,0}\underline{c} - v_i L(s+f) \right]$$
$$\le 2\left[\overline{C}_i - v_i L(s+f) \right] < 0$$

Then we can get additional necessary (but alone not sufficient) conditions needed for economic finality, that at any time during the duration of the contract, it is an unwise choice to undo the last X consecutive blocks.

$$\sum_{k=0}^{X} \left[C_{i,t} - v_i L(s+f) \right]$$
$$\le \sum_{k=0}^{X} \left[\overline{C}_i - v_i L(s+f) \right]$$
$$= X\left[\overline{C}_i - v_i L(s+f) \right] \le 0$$

And this is a sufficient condition, for undoing the last X consecutive blocks can be avoided at each time period/block. To sum up, the above equation is not only sufficient but also necessary, which means financial finality:

$$\sum_{k=0}^{X} \left[\overline{C}_i - v_i L(s+f) \right] \le 0$$

So that:

$$\overline{C}_i - v_i L(s+f) \le 0, 0 < t < L$$

More specifically, for the situation in which the number of reductions in valid contracts is in a geometric sequence, the necessary and sufficient condition for financial finality is:

$$\beta N_m P_{i,0}\underline{c} - v_i L(s+f) \le 0, 0 < t < L$$

$$\beta N_m \overline{P}_{i,0}\underline{c} \le v_i L(s+f), 0 < t < L$$

Therefore, the number of verifiers can be obtained:

$$v_i = \frac{\overline{C}_i}{L(s+f)}$$

Substitute it into the general model:

$$v_{i1} = \frac{N_m \delta}{s\left[(1+\delta)^L - 1\right]} \times \beta \times P_{i,0}\underline{c}$$

According to the calculation formula of the fee rate, the fee rate is $\underline{\pi}_1$:

$$\underline{\pi}_1 = \frac{Lv_i f}{N_m P_{i,0}} = \delta\left[1 - \frac{L\delta}{(1+\delta)^L - 1}\right] \times \beta \times \underline{c}$$

Lemma 1: Fee rate for market participants $\underline{\pi}$ is independent of verification capital s, as well as the initial number of contracts.

Lemma 2: Fee rate for market participants $\underline{\pi}$ is in positive correlation with the maximum loss rate $\underline{c}$ and the contract length L, and is in negative correlation with the rate at which the contracts decrease $(1 - \beta)$.

Proof of Lemma 2:

Obviously, the fee rate $\underline{\pi}$ is in positive correlation with the maximum loss rate $\underline{c}$, and is in negative correlation with the rate at which the contracts decrease $(1 - \beta)$.

$$\frac{\partial \underline{\pi}}{\partial \underline{c}} = \delta\left[1 - \frac{L\delta}{(1+\delta)^L - 1}\right] \times \beta > 0$$

$$\frac{\partial \underline{\pi}}{\partial \beta} = \delta\left[1 - \frac{L\delta}{(1+\delta)^L - 1}\right] \times \underline{c} > 0$$

Then we prove that the fee rate $\underline{\pi}$ is in positive correlation with the contract length L.

We set $f(L) = \dfrac{L}{(1+\delta)^L - 1}$

Then we know that the monotonicity of $f(L)$ is different from that of $\underline{\pi}(L)$.

$$\frac{\partial f}{\partial L} = \frac{(1+\delta)^L - 1 - L \cdot (1+\delta)^L \cdot \ln(1+\delta)}{(1+\delta)^L - 1}$$

We set $g(L) = (1+\delta)^L - 1 - L \cdot (1+\delta)^L \cdot \ln(1+\delta)$

$$\frac{\partial g(L)}{\partial L} = -L(1+\delta)^L \left[\ln(1+\delta)\right]^2 < 0$$

So we can get: $g(L) < g(0) = 0$,

So $f(L)$ is monotonically decreasing in our domain, then we have $\underline{\pi}(L)$ increases monotonically with respect to L, the length of contract duration.

Next, to better analyze the embedded supervision model, let us introduce the concept of redundant validation capital RVC. As $v_i(s+f) \geq \overline{C}_i \geq C_{i,1<t<L}$, excess verification capital starts to accumulate over time. Expanded to the general case, the residual verification capital accumulated in contract from time $t = 1$ to $t = X < L$ is:

$$RVC_{1,X(X>0)} = \sum_{k=1}^{X}\left[v_i L(s+f) - C_{i,t} \right]$$

Real-Time Embedded Supervision Model

If market participants know that regulators are going to use information from the blockchain, they may have an incentive to report false information in order to deceive regulators.

In order to consider the influence of regulators on the market in the model, extra gains and losses of each contract $r_{i,t} < b_i$ are assumed to occur before the expiry date.

$$\begin{cases} r_{i,t} \in [-\underline{r}, \overline{r}], 0 < t < L \\ r_{i,t} = 0, t \geq L \end{cases}$$

$$R_{i,t} = N_{i,t} P_{i,t-1} \underline{r}, 0 < t < L$$

$$\overline{R}_i = \max_{0<t<L}\left(R_{i,t} \right) = N_m P_{i,0} \underline{r}$$

Furthermore, when considering the case of real-time supervision, the total utility of regulators, market participants and verifiers is $E(U_R + U_c + U_v)$. So, the necessary and sufficient conditions of the economic finality is:

$$E\left\{ \max_{X<L}\left\{ \sum_{k=0}^{X}\left[C_{i,t} + R_{i,t} - v_i L(s+f) \right] \right\} \right\}$$

Which can be simplified as:

$$\overline{C}_i + \overline{R}_i \leq v_i L(s+f), 0 < t < L$$

That is:

$$N_m P_{i,0}\left(\underline{c} + \underline{r} \right) \leq v_i L(s+f)$$

Then the number of verifiers in the real-time supervisory model is:

$$v_{i2} = \frac{\overline{C}_i + \overline{R}_i}{L(s+f)}$$

Substitute the above equation into the real-time supervisory model and we get:

$$v_{i2} = \frac{\overline{C_i} + \overline{R_i}}{L(s+f)}$$

$$= \frac{N_m \delta}{s\left[(1+\delta)^L - 1\right]} \times \beta \times P_{i,0} \times (\underline{c} + \underline{r})$$

According to the equation, the fee rate is:

$$\underline{\pi}_2 = \frac{L v_i f}{N_m P_{i,0}}$$

$$= \delta \left[1 - \frac{L\delta}{(1+\delta)^L - 1} \right] \times \beta \times (\underline{c} + \underline{r})$$

When the number of verifiers and the fee rate meet the above equation, regulators can read the books in real time to achieve automatic market regulation, but this situation means that higher verification capital is required than the simplified model.

Embedded Supervision with a Lag

Because real-time regulation is more expensive, we introduced delayed compliance regulation. Suppose the regulator allows the use of compliance regulation every D time period. Then the redundancy verification capital in the lagging D period satisfies the following equation:

$$RVC_{2,D(D>0)} \geq R_{i,D}$$

Under the embedded supervision with a lag, supervisors' costs will be less than those under real-time supervision. This cost can be specified as $R_{i,D}$, and then the total utility of the supervision model with a lag is $E (U_{RD} + U_c + U_v)$. Then the sufficient and necessary condition of embedded supervision with a lag is:

$$E\left\{ \max_{X<L} \left\{ \sum_{k=0}^{X} \left[v_i(s+f) - C_{i,k} \right] \right\} \right\} \leq R_{i,D}$$

Finally, the number of verifiers and the fee rate required can be expressed as follows:

$$\sum_{k=1}^{D} \left[v_i L (s+f) - C_{i,k} \right] = R_{i,d}$$

$$v_{i3} = \frac{1}{L(s+f)} \times \frac{1}{D} \times \left[\sum_{k=1}^{D} C_{i,k} + R_{i,D} \right]$$

$$= \frac{\beta N_m \delta}{s\left[(1+\delta)^L - 1\right]} \times \frac{1}{D} \times P_{i,0} \times \left(\frac{1-\beta^D}{1-\beta} \times \underline{c} + \beta^{D-1} \underline{r} \right)$$

$$\underline{\pi}_3 = \frac{\pi_3}{P_{i,0}} = \frac{L v_i f}{N_m P_{i,0}}$$

$$= \delta \left[1 - \frac{L\delta}{(1+\delta)^L - 1} \right] \times \beta \times \frac{1}{D} \times \left(\frac{1-\beta^D}{1-\beta} \times \underline{c} + \beta^{D-1} \underline{r} \right)$$

More strictly:

$$\sum_{k=I}^{D}[\ v_i L\ (s{+}f){-}\overline{C}_i\ ]{=}\overline{R}_i$$

Therefore, the necessary and sufficient condition for the embedded supervisory model with a lag can be simplified as:

$$v_i L(s + f) - \overline{C}_{i,k} < \frac{R_i}{D}$$

The number of verifiers for the embedded supervisory model with a lag is:

$$v_{i3} = \frac{\overline{C}_i + \dfrac{\overline{R}_i}{D}}{L(s + f)}$$

The fee rate of the embedded supervisory model with a lag refers to equation:

$$\underline{\pi}_3 = \frac{\pi_3}{P_{i,0}} = \frac{L v_{i3} f}{N_m P_{i,0}}$$

The expansion is:

$$v_{i3} = \frac{N_m \delta}{s\left[(1+\delta)^L - 1\right]} \times \beta \times P_{i,0} \times \left(\underline{c} + \frac{r}{D}\right)$$

$$\underline{\pi}_3 = \delta\left[1 - \frac{L\delta}{(1+\delta)^L - 1}\right] \times \beta \times \left(\underline{c} + \frac{r}{D}\right)$$

In conclusion, for $0 < D < L$, we have:

$$v_{i2} = v_{i1} \cdot \left[1 + \frac{r}{\underline{c}}\right]$$

$$v_{i3} = v_{i1} \cdot \left[1 + \frac{r}{D\underline{c}}\right]$$

$$\underline{\pi}_2 = \underline{\pi}_1 \cdot \left[1 + \frac{r}{\underline{c}}\right]$$

$$\underline{\pi}_3 = \underline{\pi}_1 \cdot \left[1 + \frac{r}{D\underline{c}}\right]$$

In all existing regulations, there is a great time lag in the delivery of data from the regulated to the regulators. But in this model, the verifiers have immediate access to certain data, and only take regulatory action after a certain period of time.

Conclusion

The sufficient and necessary condition for the economic finality is: at the end of time point t,

no strategy to undo the last $0\sim X$ ($X < L$) blocks can ever be profitable, even under the most adverse realization of payoffs. And it can be expressed as an inequality:

$$\begin{cases} E\left\{\max_{X<L}\left\{\sum_{k=0}^{X}\left[C_{i,t}-v_i\left(s+f\right)\right]\right\}\right\}\leq 0, & \text{Non-Regulation} \\ E\left\{\max_{X<L}\left\{\sum_{k=0}^{X}\left[C_{i,t}+R_{i,t}-v_i\left(s+f\right)\right]\right\}\right\}\leq 0, & \text{Real-time Regulation} \\ E\left\{\max_{X<L}\left\{\sum_{k=0}^{X}\left[v_i\left(s+f\right)-C_{i,t}\right]\right\}\right\}\leq R_{i,t}, & \text{Regulation with a lag} \end{cases}$$

According to the equations above, the number of verifiers and transaction fee rates of participants is:

$$v_i = \begin{cases} \dfrac{\overline{C}_i}{L\left(s+f\right)}, & \text{Non-Regulation} \\[2ex] \dfrac{\overline{C}_i+\overline{C}_i}{L\left(s+f\right)}, & \text{Real-time Regulation} \\[2ex] \dfrac{\overline{C}_i+\dfrac{\overline{R}_i}{D}}{L\left(s+f\right)}, & \text{Regulation with a lag} \end{cases}$$

$$\underline{\pi} = \frac{Lv_i f}{N_m P_{i,0}}$$

The embedded supervisory model with a lag works better than the real-time embedded supervisory model, and it satisfies the relationships of the analysis in the previous section

$$v_{i2} = v_{i1}\cdot\left[1+\frac{r}{\underline{c}}\right]; \quad v_{i3} = v_{i1}\cdot\left[1+\frac{r}{D\underline{c}}\right];$$

$$\underline{\pi}_2 = \underline{\pi}_1\cdot\left[1+\frac{r}{\underline{c}}\right]; \quad \underline{\pi}_3 = \underline{\pi}_1\cdot\left[1+\frac{r}{D\underline{c}}\right].$$

It will cost more to take regulatory measures than not, but it takes less to take regulatory measures with a lag as the number of verifiers and the transaction fees required by embedded supervision decrease.

By observing the calculation results, we can see that the smart contract based on the distributed ledger is Villefredo Pareto improved compared with the traditional contract, and the cost of delayed supervision is lower than that of real-time supervision. In addition, with the development

and application of distributed ledgers in the blockchain industry, as well as the low fixed cost of compliance of distributed ledgers, the decentralized financial system has the foundation to take root and acquire effective support from the legal system and registered rating agencies and other supporting institutions. In the current traditional financial market, centralized finance is still the mainstream. Despite great technological progress, the price of financial services is still high due to information asymmetry even though the distributed ledger market can effectively reduce the costs of compliance with financial regulation and reduce the entry threshold. At the same time, regulators can write their own regulatory ideas, methods, and standards into the contract, to achieve embedded supervision, reduce regulatory costs and ensure a level playing field for participants.

For market participants, traditional financial markets generate commissions and fees when buying and selling contracts. However, in the distributed market with embedded regulation, the fee rate is low, which encourages participants to enter this emerging market. For the verifiers, the profit and loss of the participant must be verified by the verifier. If the block is proved invalid, the existing transaction will be regarded as invalid, and the verifier will lose a given amount of verification capital, which controls the illegal operation of the verifier and establishes the relevant criterion. For regulators, they can carry out embedded supervision through distributed ledgers at any time and take delayed regulatory measures to ensure the normal operation of the market while improving efficiency without reducing profits.

Until now, newly issued tokens known as block rewards in blockchain have accounted for the majority of mining revenues. As new block rewards are phased out, crypto transaction liquidity will decline significantly, which may require social coordination or institutionalized support. Regulators also need to develop complementary frameworks for managing distributed markets and their infrastructure, such as burden-sharing for decentralized market crime, to deliver higher quality and more efficient compliance at a lower cost.

Future Expectations for Embedded Supervision

The application of embedded supervision requires not only strict demonstration of rationality and feasibility through mathematical models but also top-level design from the systematic aspect to ensure the completeness of its internal logic. Here we give a vision of an embedded future system.

Regulatory technology based on distributed ledger blockchain will be the mainstream in the future, and it will no longer just be based on big data platforms. In 2020, Travel Rule Information Sharing Architecture (TRISA) put forward the concept of a supervision network, a network of interconnected regulatory systems, where trading and regulation go on at the same time. Facebook's Libra system also has embedded supervision, and the Bank for International Settlements, the Bank of England and several foreign research institutions are proposing the same concept. For these and similar systems, the embedded supervision algorithms would be confidential. Under embedded supervision with a lag, the information is verified by the verifiers, and the transaction information

will be delivered to the transaction monitoring system at the same time. This supervision system has access to information all the time but only takes regulatory measures every once in a while. The regulatory system will check some information to assess the risks of the deal, such as trading volume, exchange risk, trading speed, and personal information. The deal will trigger in-depth risk research if it is found to be risky. And if there is a significant risk, the transaction will be interrupted, and the examiner will be punished.

Embedded supervision based on blockchain requires multi-party simultaneous online collaborative interactive regulation. Embedded supervision promotes sector-specific supervision and institutional supervision of traditional financial supervision in the form of technology and underlying logic. It is based on on- and off-site inspection and swift multi-party online and collaborative supervision. Compliance blockchain led by regulatory authorities gathers the central bank, banking, and insurance regulatory systems as well as the systems for securities, public security, industry and commerce, and other governmental regulatory departments onto the blockchain. At the same time, embedded supervision can open interface access to all types of licensed and unlicensed financial institutions, including consumer groups, urging financial institutions to share data and transaction operations. Regulators' regulatory policies and compliance guidelines, as well as financial institutions' daily data, will be packaged and integrated into the chain, forming individual nodes. Thus a multi-party online, point-to-point interconnection interactive structure will be formed.

As a brandnew supervision method, embedded supervision should be put into official use after sandbox experiments are carried out as the operation mode and errors need to be observed during the sandbox experiments. The continuous debugging and evolution of a supervision system will improve the incompatibilities between the embedded supervision and the distributed financial systems so that it can carry out real-time supervision in distributed financial application scenarios. Globally, many countries are open to regulating technology, and some are already developing regulatory sandboxes. For instance, the Lithuanian bank is carrying out a blockchain sandbox that aims to embed regulatory infrastructure in a market based on distributed ledgers. The Federal Reserve Bank of Boston is studying the possibility of establishing a regulatory node and plans to create mock transactions to try to keep depository balances under the Federal Reserve Bank of Boston's blockchain supervision. Drawing on the practices of regulatory sandboxes in the UK, Singapore, Australia, and the US, compliance blockchain is an indispensable part of the regulatory sandbox, and it is also the trend of the optimization of the regulatory sandbox system of the future. Regulators, financial institutions, and fintech start-ups can conduct flat peer-to-peer and interoperable communication in the real test scenario of the regulatory sandbox.

Cross-border cooperation needs to be promoted. In today's globalization networks and information transfers, financial elements and technological elements are moving more frequently around the world. Financial institutions and fintech companies carry out business across countries. All these exacerbate the transmission and cross-diffusion of financial risks and the regulatory technology is attracting more attention around the world. Several countries such as the UK, Australia, Singapore and the

US have already started the research and deployment of regulatory technology and compliance blockchain. China is a late starter in regulatory technology, but it is growing fast. In addition, for enterprises themselves, the compliance risk of global operations is increasing, and penalties caused by compliance problems are also increasing. So, it is an important part of regulatory science and technology cooperation to strengthen international cooperation on compliance blockchain. It can effectively improve the prevention and governance of cross-border risks to strengthen international cooperation on compliance blockchain, and have an inhibitory effect on anti-money laundering (AML), anti-terrorist financing, and other dark web transactions. Compliance blockchain cooperation among international stock exchanges is also conducive to strengthening the ability of front-line supervision. The establishment of compliance blockchain among various countries is conducive to coordination, interaction, information sharing, and the development of regulatory technology.

As for new technological innovations, cloud computing can provide an effective solution for the storage of blockchain nodes. Node data is stored and backed up in the cloud. Data on a single node does not need to be stored on local hardware devices, which helps save space. The development of 5G will be able to expand blockchain bandwidth and increase the speed at which transactions can be processed and transmitted. For the privacy protection of data, a variety of encryption technologies and blockchain privacy protection safety valve mechanisms will enhance the privacy protection capability of compliance blockchain.

A consensus mechanism should be established among regulators, participating agencies, and verification agencies. In the original blockchain system, consensus mechanisms such as PoW and PoS allow verifiers in the block to reach a consensus on the distributed database, thereby ensuring the uniqueness and completeness of the database. When third-party regulators are introduced, it is one of the core elements of embedded regulatory applications that the basic elements of the regulatory concept, principles, and standards are written into the blockchain network. Low cost is needed for distributed financial services under the introduction of embedded supervision. If not, it will be difficult to attract more participants and verifiers to participate in the maintenance of the blockchain system. When designing embedded supervision, the derivation of mathematical models should be used to strictly prove that under supervision, participants will have lower as well as maintain. Also, it is supposed that under embedded supervision, distributed financial services can maintain their economic effectiveness. In the top-level design of embedded supervision, we need to accurately quantify the participants' service charge, the verifier's verification capital, and the regulator's cost and other parameters. The effectiveness of distributed financial operations is ensured from the aspects of system design and parameter optimization.

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Research on Big Data Platform Design in the Context of Digital Agriculture: Case Study of the Peony Industry in Heze City, China

Wang Guiping*

Heze University

Abstract: In recent years, China has successfully set up multiple single-product big data platforms. As an indigenous and unique plant in China, the peony contains immense economic returns, strong social benefits, and profound cultural heritage. Its seed oil, as an emerging edible oil, has attracted much attention. Heze city is one of the places optimal for cultivating peonies. In this context, a study of the big data of the peony industry in Heze city bears practical significance. This paper begins with the literature review of big data platforms for the entire industry. Referring to established single-product big data platforms, it reports the results of a case study of the peony industry in Heze city that identify potential difficulties and problems regarding the building of a big data platform for the peony industry that incorporates the five dimensions of service, management, application, resource, and technology.

Keywords: entire industrial chain, big data analysis, agricultural product

* Wang Guiping, School of Business, Heze University.
  Correspondence concerning this article should be addressed to Wang Guiping, School of Business, Heze University, Heze. Email: 14902478@qq.com

Introduction

Along with the development of information technology, massive amounts of data are being collected from all walks of life. However, if data is not properly analyzed, their application value is limited. The application of big data remains an issue of great importance in the new era. The concept of a national big data strategy was proposed in *Several Opinions of the General Office of the State Council on Strengthening the Services and Supervision over Market Entities by Means of Big Data Analysis*. Nowadays, big data have been applied to a wide range of industries in China, creating more and more value through application analyses. According to existing research, studies on big data generally focus on their application to specific industries, while studies on big data platform design remain scarce. It is difficult to analyze big data in China's agriculture because it is dispersed, seasonal, and regional. Taking big data in agriculture as the starting point, the article explored the design of a single-product big data platform for the entire industrial chain, using the peony industry as an example.

Literature Review

Overseas Research of Big Data in Agriculture

Big data in agriculture is a combination of science and technology, aimed at integrating various functions of big data into agricultural economic management to constantly develop and improve relevant ideas, techniques, and practices. A functional big data platform in agriculture would analyze cross-industry and cross-business data on agricultural production such that the analysis is applicable to all fronts of agricultural economic production, mainly serving tangible spheres of agricultural production such as plowing, fertilization, sowing, and harvesting. Big data in agriculture is the combination of both agriculture and big data. Therefore, it is holistic, diversified, valuable, accurate, and can be rapidly processed due to the characteristics of data information. Meanwhile, due to the complex characteristics of agriculture, big data in agriculture is real-time, high-dimensional, dispersed in storage, difficult to analyze, and extensive in all aspects involved.

Developed countries in Europe and America spearheaded the research on big data in agriculture. The IT application in agriculture in the US dates to the 1950s and has been the leading light in this area for over half a century. It has required public and private sectors to jointly build large agricultural data centers. It has promoted IT applications on all fronts, including IT applications in agriculture, information network building along with information resource development and utilization to encourage the use of agricultural data and improve agricultural management. In 2009, the US government disclosed its data, including agricultural natural resource data, agricultural production data, and agricultural food safety data. In 2013, the British government launched a UK strategy for agricultural technologies. In it, the role of big data technology in transforming

agricultural development modes to propel agricultural development was highlighted. According to the strategy for agricultural technologies, big data technology can realize precise cultivation and breeding while better connecting agricultural production to consumer markets.

As for France, over years of practice, its agricultural information database has become exhaustive, covering a wide range of agricultural domains, including cultivation, fisheries, animal husbandry, and agricultural products processing. With its established agricultural database, France shares information through the Internet and other channels on a regular basis to serve agricultural production and regulate the market order of agricultural product marketing. Germany is committed to developing advanced digital agriculture. Through the application of big data and cloud technologies, data concerning weather, soil, precipitation, temperature, and the geographic location of a field is uploaded to a cloud terminal where it will be processed and then transmitted to smart agricultural machines to carry out precise operations. The G8 Summit, held in 2013, launched a forum themed on opening agricultural data, which provided suggestions for countries to employ big data in agriculture to develop agriculture and build big data platforms in agriculture.

Recent years have witnessed some typical big data application cases. For example, at the Soil, Big Data, and the Future of Agriculture Conference held in 2015, the United States Secretary of Agriculture announced the launch of a real-time soil data monitoring program and the development of an interactive big data platform to help farmers select optimal crops for cultivation to save agricultural expenditure, improve agricultural product quality and output. Farmeron, an agricultural service company located in Croatia, built a similar agricultural enterprise resource planning (ERP) platform, which is committed to collecting, integrating, and analyzing statistics from agricultural data to facilitate agricultural management and guide production. Silent Herdsman, a British agricultural information company, installed an Internet of Things (IoT) monitoring device and wireless transmission network on cattle to enable farmers to monitor their cattle in real time through a tablet computer or a mobile phone to improve their animal husbandry quality.

Domestic Research of Big Data in Agriculture

Recently, China has emphasized the role of agricultural modernization and IT applications and has issued a number of important documents on big data, such as *Notice of the State Council on Issuing the Action Outline for Promoting the Development of Big Data*, and *Study on Agricultural Informatization Development Strategy in China*. The release of a series of measures and planning have created favorable external environments for the building of big data platforms in agriculture. In 2013, the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences (CAAS) took the lead in establishing a National Agricultural Informatization Union (AIU) in the hope of building an agricultural information cloud to integrate agriculture-related resources to create a platform featuring common development and shared growth for agricultural production and development.

In 2021, State Council of the People's Republic of China issued the *Opinions of the Central Committee of the Communist Party of China and the State Council on Comprehensively Promoting*

Rural Revitalization and Accelerating Agricultural and Rural Modernization. It projected developing agriculture as a central system, where smart agriculture forms an entire smart agricultural industrial chain through "Internet +" agricultural enterprise and "Internet +" agricultural industry, relying on big data in agriculture, cloud computing, and the IoT. Smart agriculture aims to promote integration between modern information technology and the whole agriculture production process. Developing smart agriculture and building the big data system for agriculture and rural areas is the new format of agricultural development.

Only in recent years have domestic research institutes and experts taken the initiative to study big data. Wen Fujiang (2013) studied the significance of big data research and pointed out that the agricultural and big data union was an innovative development. Sun Zhongfu et al. studied the demand for big data in agriculture and their application scenarios. Xu Shiwei argued that integrating big data, green agricultural development, and high-quality development would blaze a new path to make agriculture IT-based, digital, and streamlined.

Rapid progress has been made in agricultural research and applications, at home and abroad. Countries and regions value IT applications and big data in agriculture. Foreign enterprises have done extensive research on the applications of big data in agriculture, standardizing their applications and constantly increasing their precision and effectiveness. Studies on big data in agriculture in China date back to 2013. They focused on the strategic significance of big data in agriculture, macro policies, and the prospect of the application of big data in agriculture to rural revitalization and agricultural production from a theoretical perspective. They argued that a big data platform would be a good solution to problems in the traditional agricultural chain, such as no direct access to dealers and end farmers due to tedious marketing channels and the difficulty in promoting the sales network of existing agricultural enterprises due to wide and complicated agricultural services.

There are few studies on the application of big data in smart agriculture due to the following factors.

(a) It is difficult to access big data in agriculture. As big data in agriculture involves multiple facets such as climate, soil, air quality, crop ripening, and investment in agricultural equipment, it is rather difficult to gather big data in agriculture. Besides, big data in agriculture is a recent thing in China. Incomplete historical data and insufficient data stock, to a great extent, make it difficult for people to apply the available data extensively and effectively.

(b) The structure of big data in agriculture is diversified. In addition to traditional structured data, big data in agriculture comprises multimedia data such as graphs, text, audio, video, as well as subjective content such as farmers' production experiences. The collection of big data in agriculture is subject to natural and human factors, which will lower data quality and accuracy. So, it becomes rather challenging to foresee the focus and the difficulty of agricultural production and operational activities accurately and punctually.

(c) The public has little access to big data in agriculture because the available data has not been adequately distributed. Consequently, big data in agriculture has not been popularized or extensively applied.

(d) The authenticity of data is subjected to the subjective will of the technicians who create the

programs that are intended to manage the industry and other external factors. When data collection and analysis become subjective, data applications would be limited.

Outline and the Application Value of the Single-product Big Data Platform

Outline of the Single-Product Big Data Platform

Meng Xiangbao put forward SMART (Service, Management, Application, Resources, Technologies), an agricultural big data information system framework. He expounded on the main technologies, relevant resources and common application scenarios for big data in agriculture, and developed a big data platform in agriculture based on smart analysis. Xu Shiwei studied the critical technologies of agricultural information monitoring, agricultural production warnings, and agricultural data-based information processing. In 2017, an agricultural big data management center was set up in Heilongjiang province, aiming at assisting agricultural platforms in collecting, processing, storing, and sharing big data in agriculture.

On March 2, 2018, Ministry of Agriculture and Rural Affairs of the People's Republic of China proposed that efforts should be made to jointly build shared big data analytical platforms featuring product and industry-related features, such as a model of single-product big data. The concept of the entire industrial chain comes from practice. It is an industrial development pattern that connects product upstream and downstream, such as raw material supplies, production factors, and marketing. The entire industrial chain ranges from land cultivation to customer consumption. Big data creates favorable conditions for the management of the entire industrial chain. Coupled with rural E-commerce, big data can better link the nodes in the industrial chain, and ensure that the entire industrial chain can work efficiently.

An agricultural single-product big data platform is a data collection and monitoring system. It meets governmental demands for single-product market supervision and developing a competitive industry, and the demands of individual single-product production and management businesses and farmers for data-based information. It makes full use of the Internet, IoT, and big data. It can trace the quality and safety of single products, and realize real-time monitoring and warnings for potential problems developing in the links of the entire industrial chain. It is conducive to achieving breakthroughs in governmental monitoring. It provides better services to production and management businesses and individuals. It will ultimately contribute to the sound development of regional single-product industry and brand building. It blazes a new path for rural economic development, targeted poverty alleviation, and the building of a new type of production and operation system.

Application Value of the Single-Product Big Data Platform

The decision to build a single-product big data platform to realize big data in agriculture is based on the following considerations.

(a) Developing and applying big data in agriculture is a complex and systematic project. Data

sources are multiple with complicated and diversified data types. Meanwhile, the phenomenon of isolated data islands is prominent. No existing experience or mode is available. So, it will take a long time to build a sound and complete big data platform in agriculture. Fortunately, building a single-product big data platform entails fewer data types. One example is the live pig big data center set up in 2017. The center can collect, share and exchange data, and can thus gather data relevant to live pig breeding, transactions, processing and circulation, as well as the operations of feed, veterinary medicine, breeding machinery, and other related industries. Via the center, the government and relevant organizations share and exchange live pig data. By establishing a series of models for live pig production, testing and warnings, the center provides a first-hand decision-making basis for the state to precisely regulate the development of the live pig industry and national economy to prevent periodic imbalances and fluctuations of live pig supplies and demands.

(b) Now that single products nationwide are large-scale, concentrated, and highly market-driven with an entire industrial chain and solid digital foundation, it is easier to obtain complete big data in agriculture by starting with single products. For example, the big data platform for the entire industrial chain of mango production, set up in 2019, mainly relies on the Tianyang district, Baise city of Guangxi Zhuang autonomous region, and one major mango production base in China. To meet the actual demand for mango industrial development and brand building in Huaping county, this big data mango platform, underpinned by big data and IoT, has been developed and is oriented to nationwide mango market players. Meanwhile, it is boosting local mango branding and improving its status to encourage and promote the sound development of the Chinese mango industry.

(c) The experience of single-product big data development can be applied to broader areas concerning agriculture, rural areas, and farmers, thus providing applicable mechanisms, patterns and experiences for the big data development and application throughout the entire agricultural industry. In 2018, a state-level apple industry big data center was established. By searching, collecting, and analyzing key data concerning apple cultivation, processing, circulation, marketing, imports, exports, and consumption, the center manages to reliably predict the effects of supply and demand, and price in the apple industry. In this way, it can issue early warnings against unusual conditions in production and market pricing. It can develop a full picture of the apple industrial chain and can construct a digital ecology for the chain, and provide applicable patterns and a development history that can be applied to the development of a big data platform for the entire agricultural industry.

Outline of the Peony Industry in Heze City and a Feasibility Analysis

Outline of the Peony Industry in Heze City

Peony is one of the four most famous traditional flowers in China. It is reputed to be the queen of flowers due to its beauty and elegance. It has a history of more than 2,000 years of artificial cultivation. It is characterized by large and charming petals, bright colors, and a pleasant aroma.

It is so highly adorable that it is popular at home and abroad. Since the implementation of the reform and opening-up policy, China's peony industry has evolved from traditionally medical and ornamental uses to holistic applications. The peony industry mainly consists of ornamentation, deep processing, and derivative categories. Deep processing means that the beneficial ingredients of peony are extracted and transformed into marketable items. For example, peony seed oil, peony cosmetic products, peony medicines and peony health care products constitute the main emerging peony businesses, all playing an important role in the peony industry. Peony derivatives, such as peony-themed porcelain, stone, calligraphy, and paintings, are embedded in peony culture, which play an increasingly important role in the peony industry.

Since ancient times, peonies have been cultivated in Shandong province. During the Ming and Qing dynasties, it was said that Caozhou's peony topped the whole country. Caozhou is the present Heze city. Heze city is in the southwestern part of Shandong province in the alluvial plain of the Yellow River which is characterized by a deep layer of topsoil, high fertility (rich in organic matter and available nitrogen, phosphorus, and potassium), a warm climate, plentiful precipitation (annual average precipitation reaches 6,808 mm). These conditions combine to make Heze city an ideal place for cultivating peony.

Heze city cultivates nine color systems, ten flower types, and 1,259 varieties. Its cultivation area exceeds 486,000 *mu* (hectares), and the number of peony growing households exceeds 60,000, the number of production, processing and marketing enterprises surpasses 240, and annual production value exceeds RMB6 billion. Peony products have been sold to more than 30 countries and regions, including the US, the Netherlands, Russia, Germany, Japan, and France, accounting for over 80 percent of nationwide peony exports. Heze city is the cultivation center with the largest cultivation area, the maximal varieties and the widest range of flower colors in the world. It is also China's largest and most important peony science research, production, processing, ornamentation, and export base. The peony industry has grown into one of the new pillar industries of economic development in Heze city. So, big data research on the peony industry in Heze city bears practical significance.

Feasibility Analysis of the Big Data Platform for the Peony Industry

Feasibility analyses of the big data platform for the peony industry mainly comprise analysis of economic feasibility, technical feasibility, and social feasibility.

Economic feasibility.

In the new era, data increases in an exponential manner. So far, there has been public open data cloud space formed by data for weather forecasting, soil monitoring and other industrial links, which can provide satisfactory data support for the big data platform for the peony industry. Once the platform is established, it can produce good economic returns and advance agricultural development. So, it boasts high economic feasibility.

Technical feasibility.

IT applications in agriculture have become popular. Data can be accessed if a platform is

connected to a modern system or through other technical channels. Many researchers have studied the application of big data in agriculture and have come up with fruitful findings.

Social feasibility.

Through data standardization, collection, processing, storing and visualization, and with the support of big data-based agricultural emergency management smart centers, people can keep abreast of the latest in agricultural trends. So, once the big data platform for the peony industry is in place, it can satisfy the needs of agricultural development, marketing, and management.

Overall, the big data platform for the peony industry has economic, technical, and social feasibility.

Big Data Platform Design for the Peony Industry

Considering the design ideas of a platform for big data collection, decision-making, and management. This refers to the data collection technology of the recently established single-product big data platforms and agricultural dynamic databases based on data storage technology. On this basis, platform design should adhere to the principles that a platform should be well arranged and planned, realize resource sharing, be efficient and steady, operate in real-time, practical, expandable, widely applicable, and user-friendly. In line with the demands of the peony industry and top-level design principles, the article proposes a big data application framework for the peony industry from the aspects of service, management, application, resource and technology, as shown in Figure 1. The content of each part of the system from bottom to top is elaborated as follows.
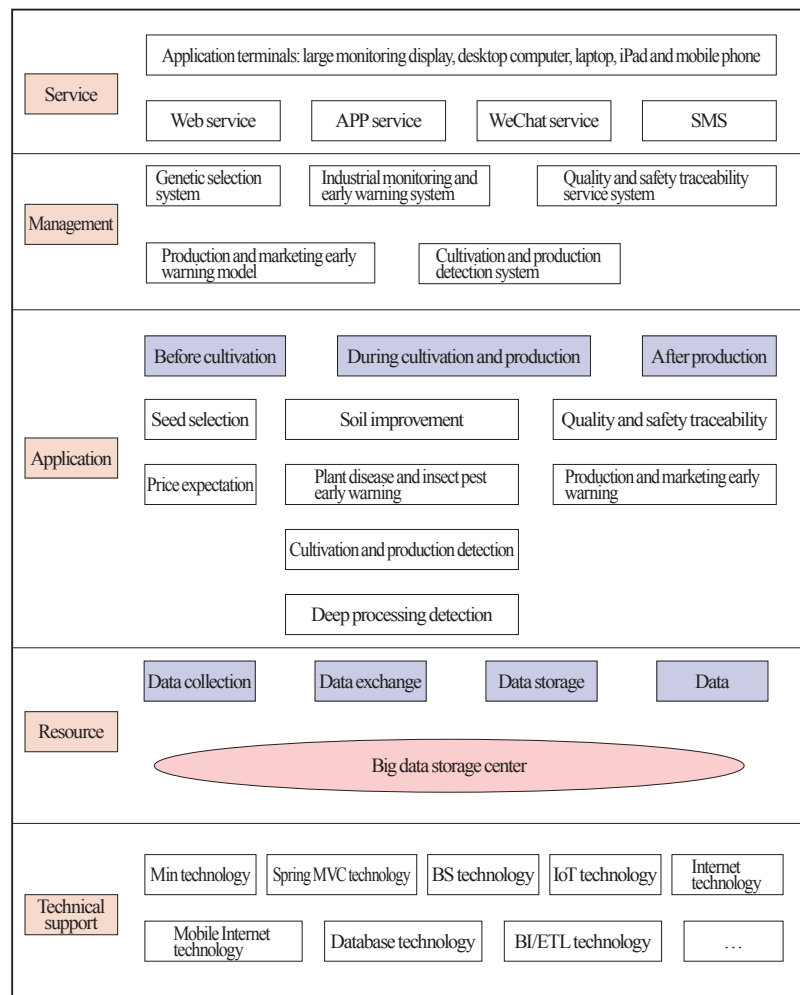
Figure 1: Planning Diagram for the Big Data Platform for the Peony Industry

Technological Support as the Foundation for Big Data Applications in the Peony Industry

Common data collection methods include direct entry, data filling, and table importing. Large-scale public data collection generally adopts web crawler technology, which can be generally divided into general web crawler technology, deep web crawler technology, incremental web crawler technology, and focused web crawler technology.

Traditional database technology can only process a certain amount of data and general data complexity. When data is bulky, complex, and diverse, it is best to employ big data technology to deal with data collection, analysis, and visualization. Big data adopts full data analysis methods such as Min technology, Browser/Server technology, and Internet technology instead of the random sampling method.

Internet technology and mobile Internet technology constitute the network layer of the platform, forming a sound smart agricultural network layer. The network layer solves the problem of transmitting the data obtained by the sensing layer within a certain range, especially over long distances. Network transmissions and communications are mainly established through wireless networks, the Internet, and general data collection platforms to realize real-time collection and storage, as well as real-time transmission of peony industry-related data to workstations at the base and big data centers, thus forming a perfect peony industry network layer system. It is necessary to apply IoT, big data and AI to establish an integrated technical system and application platform of multi-source data sensing, deep learning, and deductive reasoning, so that information technology can be widely used in the entire industrial chain and lay a foundation for highly intelligent cultivation management.

At the big data resource layer, a big data storage center collects, exchanges, stores, computes, analyzes and processes the big data resources of the peony industry, and realizes the information conversion from the network layer to the application layer, the management of network equipment, and the presentation of equipment information and business information. The platform layer is a technical platform for the unified arrangement of various applications and services at the application layer. It can provide the basic operational environment for the peony, carry out unified management, and provide support for various intelligent applications at the upper layer. It constitutes the foundation of the construction and operation of big data analysis and decision support for the peony industry.

Application Platform as the Concrete Implementation of the Big Data of the Peony Industry

The application layer makes full use of various intelligent computing and information processing technologies such as cloud computing, pattern recognition, and artificial intelligence to analyze and process mass data and information, and dynamically optimizes production, management, and marketing schemes. It is the core of data processing. It is mainly divided into three modules: application before cultivation, application during cultivation and production, and application after

production.

Major applications involved before the cultivation process.

The application before cultivation mainly involves seed selection and price expectation. According to the different uses of the peony and based on the collection of seed selection data in recent years, the genes of the peony are sorted and analyzed. Genetic technology is applied in combination with various factors such as weather, soil, records of plant diseases, insect pests, and market demand to cultivate excellent varieties resistant to natural disasters, helping farmers to reduce economic losses. For example, for ornamental peony products, new varieties can be cultivated through breeding data; and for deep-processed peony products, optimal peony varieties can be cultivated through big data. Price expectation is to adjust the planting or supply quantity for the coming year according to various types of early warning information in the early warning model of production and marketing forecast to maximize benefits.

Major applications involved during the cultivation and production process.

The application during cultivation and production mainly involves four aspects: soil improvement, plant disease and insect pest early warning, cultivation and production detection, and deep processing detection. Soil improvement refers to putting forward effective suggestions for soil improvement according to the nutritional requirements of the peony, the current distribution of soil moisture and fertilizer, and intelligently proportioning and accurately spraying the required fertilizer to reduce unnecessary waste. In addition, measures are taken to detect whether the microorganisms contained in the soil have an impact on the growth of the crops to be cultivated and corresponding disinfection mechanisms are adopted to minimize possible risks.

The outbreak of plant diseases and insect pests is closely related to the environment and weather. Based on previous data, possible plant diseases and insect pests can be predicted. During the growth cycle of the peony, sensors, unmanned aerial vehicles, cameras, and other equipment should be employed to monitor the whole process in real time through the detection and early warning system of plant diseases and insect pests to achieve accurate and effective prevention and control to ultimately improve the production efficiency of the peony and increase farmers' incomes.

Cultivation and production detection refers to analyzing and processing the required data which is scientifically collected through IoT technology in agriculture during the peony production process, and then providing precise agricultural formula and agronomic measures, intelligent management decision-making and facility control to improve peony quality and yield, as well as farmers' efficiency and income. For example, it is necessary to comprehensively monitor and accurately manage the environmental impact factors, including soil, atmosphere, water quality, meteorology, pollution, and disasters.

Deep-processed peony products, such as peony seed oil, peony cosmetic products, peony medicines and health care products, are the new pillars of the peony industry. Peony seed oil is considered the best oil in the world by relevant experts because of its rich nutrition and unique health care functioning. The deep processing of the peony is the key link to extend the industrial chain

and upgrade the value chain of the peony. Monitoring the deep processing of the peony refers to the construction of the whole-process quality control, clean production, and traceability system to produce and develop various foods and processed products that are safe, high-quality, nutritious, healthy, and green to ultimately promote the recycling and high-value utilization of resources.

Major applications involved after the production process.

The application after production mainly involves quality and safety traceability and production and marketing early warning system. Producers in the traditional sales chain cannot be effectively connected to the market, and the sales channels are relatively monotonous, which leads to low benefits or even losses for many farmers. With the popularization of information technology, every farmer can set up their own ID to record information from sowing to logistics and transportation. With this data, a peony quality and safety information big data center can be established. The quality and safety traceability system can adopt QR code traceability technology to track the whole process from production to consumption of peony products so that quality is traceable and sources can be held accountable. As quality, safety and brand recognition of peony products improve, new agricultural operators can win the acknowledgment of, and access to, third-party E-commerce platforms, thus raising the brand premium of peony products and farmers' incomes.

Management Platforms as the Direct Output of Big Data Applications in Agriculture

Management platform refers to various application systems of the peony industry. Although data processing and analysis are the core functions of big data applications, the raw results are of little significance to the development of agriculture. The key is how management uses the timely results obtained from big data analysis. The management platform mainly includes the genetic selection system, the industrial detection and early warning system, the quality and safety traceability service system, along with the production and marketing early warning system. All of these are used to support the digitalization of the production and management system which facilitates intelligent analysis and decision-making for the peony industry, allows for information integration and sharing, and jointly supports various applications for the peony industry data analysis and decision support platform. For example, the production and marketing early warning system constitutes early warning information such as the balance sheet of supply and demand of specific agricultural single products and the inventory early warning index of agricultural single products in the region. When an abnormal value exceeds a certain level, the platform will automatically give production and marketing early warnings to prevent an unsalable single product from adversely affecting the local industrial development and farmers' incomes.

Information Service Center as a Support Channel for Big Data Application in Agriculture

Service is the goal of big data research and applications developed for the peony industry. The information service center provides an information service and decision support channel for the applications and services of agricultural production and management. Equipment terminals generally

include large monitoring displays, desktop computers, laptops, iPads and mobile phones. The network is generally composed of Web, App, WeChat, and SMS services. It can provide guidance for agricultural bureaus, agricultural technology stations, management bases, agricultural technology experts, agricultural technicians, and farmers to assist with cultivation, markets, processes, and transactions of peony products through plentiful application modes such as web browsers, mobile phone apps, WeChat, and SMS.

The big data analysis platform for the peony industry is based on 3S technology, IoT technology, Internet technology and database technology. Based on the forms in web browsers, mobile phone apps, WeChat, and SMS, it can solve various problems that need to be analyzed and dealt with before, during, and after the production of peony products through the genetic selection system, the product detection and early warning system, the quality and safety traceability service system, and the production and marketing early warning system.

Deficiencies in the Design of a Big Data Analysis Platform for the Peony Industry

Non-Uniform Data Collection Specifications and Unsound Standards

As a result of advances in information technology, plentiful big data resources in agriculture have been accumulated in recent years. However, due to the lack of uniform collection standards and operational specifications for agricultural data and the constant updating and changing of data collection indicators and collectors, the data resources of the peony industry are extremely complex. This gives rise to problems of low accuracy and high repetition rates in data sharing. Problems such as different data formats, different standards and a low degree of information resource sharing are common. The government needs to coordinate relevant departments to build a standardized data type interface and access relevant information through multi-disciplinary and multi-platform cooperation to ultimately realize unified resource sharing among multiple systems and remove differences at the data source.

Lack of Big Data Processing and Analysis Technology

Data analysis and processing are the core elements in the application of big data. Compared with Internet big data, peony industry data feature large quantities and great differences in quality and structure, which leads to a lack of processing and analysis technology of peony big data. At present, peony research talents are not adequately exposed to big data processing technology, which leads to many difficulties in data processing. Therefore, it is urgent to complete the storage, organization, and management of multi-source mass data, to achieve breakthroughs in the conversion and integration technologies of industrial heterogeneous data to realize rapid inquiries and reporting of mass data analyses.

Unstable Financial Supply

The development of the peony big data platform calls for support from all potential stakeholders, including finance. Financial needs include the development and maintenance of the big data platform, the training and introduction of talents, and infrastructure construction. As most peony industry participants are individual farmers, it is unrealistic to rely on farmers to raise the necessary funds. The industry has always been funded by the government and relevant departments alone. Therefore, the problems of infrastructure and talent underpinning the development of peony big data lead to the lack of development momentum for the big data platform. Therefore, first, the government needs to focus on supporting and promoting big data-related enterprises with good development momentum. Specifically, the government should give preference to taxation, land and subsidies, and pool resources to improve the overall strength of related enterprises and cooperate with relevant departments in a timely manner. Second, the government should expand financing channels and establish mutually beneficial and win-win investment cooperation between the government and the enterprises. Third, big data enterprises should actively use their own advantages to mobilize funds in all links of the industrial chain to ensure continuous input of resources.

Further Consideration

Presently, all countries are vigorously developing big data technology in agriculture to accelerate IT applications in agriculture and rural areas and promote the integration of IT applications and agricultural innovations. With the rapid development of information technology and constantly emerging new technologies, applications in the agricultural field will be quicker and more comprehensive and will achieve higher efficiency and greater convenience. Although the development of big data in agriculture in China is a recent thing, it has a high starting point, which is of great practical significance for the guidance of agricultural production in China. Practice has proved that an agricultural management platform based on big data is a brand-new research field. The peony industry is characterized by wide data sources, diverse types, a complex structure, and difficult access. That is why the research and application of peony big data is complex, diverse, and challenging. The article presented a literature review of the big data platforms for the entire agriculture industry. Referring to cases of established big data platforms, the article conducted a case study of the peony industry in Heze city to identify potential difficulties and problems regarding the building of a big data platform for the peony industry, and then presented a big data platform design that could effectively serve the peony industry from the five dimensions of service, management, application, resource, and technology. This study can stimulate motivation for the development and implementation of a single-product big data platform in the future.

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Research on the Impact of Venture Risk Tolerance on R&D Investments: Based on Entrepreneur Ability

Weng Yaqin

Sichuan Academy of Social Sciences

Han Wucheng*

University of Electronic Science and Technology

Abstract: How do start-ups enhance risk tolerance and core competition through product, technology, and service development? What is the relationship between the core competitiveness of start-ups and R&D investments? Based on the perspective of entrepreneurial ability, 222 questionnaires were used to study the factors affecting the risk tolerance of start-ups and analyze the effect of risk tolerance on R&D investments. The research shows that the interactions of entrepreneur ability and start-up funds have a positive effect on the risk tolerance of start-ups, and the risk tolerance can positively promote R&D investment willingness and intensity for new products, technologies, and services. Also, R&D investment willingness plays a partial intermediary role between the risk tolerance of start-ups and the intensity of R&D investments.

Keywords: start-ups, entrepreneurial ability, start-up funds, risk tolerance, R&D investments

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*   Weng Yaqin, Politics Rearch Institute, Sichuan Academy of Social Sciences;
Han Wucheng, Department of Economics and Management, University of Electronic Science and Technology.
Correspondence concerning this article should be addressed to Weng Yaqin, Sichuan Academy of Social Sciences, Chengdu.
E-mail: 13067223257@163.com

Risk management affects enterprises; thus, healthy risk tolerance will be beneficial to obtaining a high return on investment. The enterprise's ability to endure risks is a key factor that the enterprise must take into consideration when developing new technologies, products, services, and other important activities, especially those providing essential information for management decision-making. However, the impact of the current risk tolerance of start-ups on R&D investments is not obvious. Can start-ups launch new products, technologies, and services to enhance their risk tolerance? How can start-ups survive an epidemic, a cold economy, a shortage of funds, and other unexpected events, and how can the ability of entrepreneurs affect the risk tolerance of start-ups? Faced with many macro and micro risks, can entrepreneurs take risks involved with developing new enterprises, new products, technologies, services, research, and development to enhance the core competitiveness of enterprises? Scholars have conducted little research on the impact of R&D investments in new products, new technologies, and new services for start-ups, so this paper provides a reference for entrepreneurs to improve their entrepreneurial ability and enhance the risk tolerance of their start-ups from the perspective of entrepreneurs, aimed at (a) exploring the impact of entrepreneurial ability and entrepreneurial capital on the investment decisions regarding new products, technologies, and services of start-ups, and (b) investigating the effects of risk tolerance of start-ups on the R&D decisions regarding new products, technologies and services.

Summary of the Literature

Mainstream studies define entrepreneurial ability as entrepreneur competencies that reflect the individual characteristics of the entrepreneur. Entrepreneurial competencies are first a generalization of entrepreneurial characteristics, mainly referring to entrepreneurial behavior and internal psychological motivation, and then extended to aspects such as the entrepreneur environment. David C. McClelland (1973) first proposed the definition of competence as the knowledge, skills, competencies, and traits of high-performing employees in an organization who are capable of performing the job. Gaylen N. Chandler and Steven H. Hanks (1994) introduced the concept of competence into the field of entrepreneurial research for the first time, and defined entrepreneur competence as the ability of individuals to identify, anticipate and seize opportunities. David H. Holt (1997) pointed out that due to the differences between Chinese and Western societies, cultures, values, and educational concepts, the content preferences of Chinese and Western entrepreneurial competencies are different. Thomas W.Y Man et al. (2002) invented a six-dimensional entrepreneurial competencies model, believing that entrepreneurial competencies include opportunity competence, relationship competence, conceptual competence, organizational competence, strategic competence, and commitment competence. Soon thereafter, Chandler, Hanks, Thomas, and others, discussed their definitions of entrepreneurial competence, and Chinese scholars, after being exposed to the concept of entrepreneurial competence, also supplemented and explored the concept in accordance with China's special national conditions, and built national characteristic entrepreneurial competency models. The Chinese scholar Wang

Chongming and Chen Minke (2002). proposed eight dimensions of entrepreneurial competence: opportunity, relationship, concept, organization, strategy, commitment, emotion, and learning. From the perspective of enterprise resource reorganization, Ted Baker and Reed E. Nelson (2005) proposed that the ability of entrepreneurs to reuse resources is the process of transforming their personal capabilities into performance. Ghulam Nabi, Rick Holden, Andreas Walmsley (2010) explored the connotation and structure of entrepreneurial competencies, based on actual situations, and restored entrepreneurial activities to the entrepreneurial environment. They believed that entrepreneurial competencies should include cross-cultural competence, innovation ability, and learning ability. Maria Minniti and Moren Lévesque (2010) proposed that entrepreneurial qualities should cover both personal characteristics and social-economic factors. Ristophe Loué and Jacques Baronet (2010) believe that entrepreneurial competencies are the set of knowledge, skills, and abilities that entrepreneurs need to implement entrepreneurial activities, including self-efficacy, opportunity recognition, human capital, and social capital. Amina Omrane and Alain Fayolle (2011) divided entrepreneurial competencies according to the stages of entrepreneurship: before, during, and after entrepreneurship. H. Kaur and A. Bains (2013) understood entrepreneurial competencies as strategy, commitment, conceptual, opportunity, relationship, learning, and personal. Lawal, Worlu, and Ayoade (2016) found that perceptual factors, management skills, personality, attitude, management skills, and motivation are the key skills required for entrepreneurial sustainability. Zhou (2019) focused on the traits of entrepreneurs with a professional background in financial management; beyond the financial management knowledge base, preparatory entrepreneurs must also have strong professional judgment as well as the ability to solve practical problems. S. Jegadeeswari, Sudarvel Jayaraj and Velmurugan Ramaswamy (2020) argued that innovation capability is most important for micro, small, and medium entrepreneurs who not only introduce new products but also adopt new methods to reduce production costs. Siti Nurlaela and Sujono Sujono (2021) argue that having good entrepreneurial skills is essential to improving business success, such as the ability to take the initiative, risk-taking, creativity, and innovation.

The ten most prominent characteristics of foreign research are innovation ability, social ability, education level, perseverance, identification of business opportunities, organizational management ability, sense of responsibility, decision-making ability, independence, and adventure. Entrepreneur competencies should not only consider entrepreneurial psychological characteristics, but also include the aspects of entrepreneurial quality and entrepreneurial ability. Entrepreneurship and entrepreneurial competencies are very closely tied concepts. Entrepreneurship is the set of knowledge, skills, and attitudes required to create a business and successfully pass through the early stages of operation. It includes opportunities, financing, commitment, imagination, and operation. It is a multidisciplinary concept. The entrepreneurial ability training paradigm with vocational education characteristics should draw the essence from entrepreneurial practice. Entrepreneurs can improve their entrepreneurial ability through action learning. That is, the entrepreneurial ability should be cultivated and improved in entrepreneurial practice. The process from entrepreneurial learning to entrepreneurial ability to entrepreneurial success is a continuous relationship integration model.

Based on the perspective of resource and ability theory, entrepreneurial resources and entrepreneurial abilities have a special effect on individual choice of part-time entrepreneurial behavior. Specifically, scholars have not made specific and clear distinctions between entrepreneurial competencies and entrepreneur abilities. These two words belong to the same vocabulary expansion. Therefore, through the comprehensive summary of various studies and the collection of expert opinions, our study indicates that entrepreneur ability includes the dimensions of opportunity recognition, operation management, learning, resources, and innovation.

Risk tolerance originated in the field of finance and referred to the ability of an individual or organization to withstand the risks, including the ability integrated into the overall process of identifying cognitive risks, regulating psychological interventions, and responding to behaviors. (Rosner, 2003). Corporate risk tolerance will affect the company's earning management capabilities, and the company's risk tolerance should be moderate. Excessive evasion or carrying of risk will damage the corporate value. John E. Grable and S. Joo (2004) and Grable, John E. and Roszkowski, Michael J. (2008) define this concept separately. The research on risk tolerance is mainly focused on the influencing factors of investors' individual risk tolerance and the changes in the factors and the risk resistance of the investment portfolio and corresponding adjustments. Empirical research is the research method mainly adopted by many scholars during the past three years, using panel data as the main source. Research on corporate risk tolerance involves a wide variety of fields, including agriculture, construction, real estate, banking, foreign trade, and strategic emerging industries. With the widespread use of multivariate methods, many interdisciplinary research methods have been introduced into corporate risk tolerance, such as the 0-1 knapsack strategy method, the semi-variance risk measurement model, the black comprehensive evaluation method, the entropy method, the efficacy system method, and the fuzzy comprehensive evaluation method. In addition to researching the risk tolerance of individual investors, scholars have focused their research on the risk tolerance of certain groups, such as adolescents in China's Hong Kong (Zhu, 2019), or whether the personal characteristics of the baby boomers who are retiring are at risk. Affordability has an impact (Rabbani, Yao, & Wang, 2019), using a research theme directly focused on the enterprise. For the research of enterprise risk tolerance, scholars mainly focus on the exploration of influencing factors of enterprise risk tolerance, the research of enterprise risk tolerance in different industries and how to evaluate the risk tolerance. Factors affecting corporate risk tolerance include many aspects, such as the educational background of company executives, corporate internal control, and technical factors. When the disclosure standards for accounting become higher, the investor protection environment is better, and the company's risk tolerance is correspondingly enhanced. According to different evaluation methods, scholars have established different risk tolerance systems. For example, Liu and Jiang (2017) explored and established risk models for technical innovation of cooperative enterprises from three dimensions: internal factors, technical factors, and external environmental factors. The current research findings on corporate risk tolerance are mainly from a macro perspective, exploring the influencing factors and assessment systems of the risk tolerance of companies in a certain type of industry, and

individually studying the risk tolerance of start-ups and comparing the results to R&D investments. Therefore, after combining a complete entrepreneurial evaluation system with the characteristics of entrepreneurial enterprises and discussions with experts, our study indicates that the risk tolerance of start-ups includes the ability to withstand changes in policies and economic environments, the ability to withstand market fluctuations, the ability to acquire and strengthen political connections, the ability to obtain business and information resources, the ability to make profits, the ability to operate the business, the ability to pay debts, the ability to develop the company, the company's cash flow situation, and the ability to withstand entrepreneurial losses.

R&D investment in this study refers to the investment in new technology, new products, and new services of the company or enterprise. The willingness to invest in R&D refers to the willingness of the start-up enterprise to invest in R&D new products, new technologies, and new services, and the R&D investment intensity (RDI), measured by "enterprise R&D investment / operating income," which is the variable most scholars use to explain the factors affecting R&D investment. Hall (2002) pointed out that R&D investment differs from general investment mainly in the following aspects: R&D investment output has high uncertainty. Song, Zhou, and Jia (2019) studied the impact of economic openness and R&D investment on green economic growth. The effect of R&D scale on green economic growth is positive in the long run and negative in the current period for the eastern and western regions. Alam, et al. (2020) conclude that managers may want to enhance investor protection to promote high R&D investments to improve firm performance. Khan, et al. (2020) modeled an investigation on how uncertainty [firm-specific uncertainty (FSU), market-based uncertainty (MU), and economic policy uncertainty (EPU)] affect research and development (R&D) investment. Research on the internal factors affecting corporate R&D investment is very complicated and involves various financing constraints. Financing constraints were first proposed by Fazzari, Hubbard, and Petersen (1987), and refer to the phenomenon that information asymmetry and principal-agent problems cause external financing costs to be higher than internal financing costs. At present, there is much controversy in the measurement of financing constraints. When scholars at home and abroad carry out research on financing constraints, they look for suitable proxy variables to measure these constraints, and divide the proxy variables used to measure the constraints into internal variable indicators and external variable indicators. At present, the prevailing view is that the financing constraints faced by R&D investment are more severe than general investments, and because external financing costs are often higher than internal financing costs, companies tend to perform internal financing first (Himmelberg & Petersen, 1991). Research by Brown, Martinsson, and Petersen (2012) found that for small-scale and short-term high-tech enterprises, endogenous financing is more important. According to the existing research results, scholars believe that the personal characteristics of the CEO (manager), the characteristics of the management team, and the internal control management of the enterprise are the main factors affecting the internal financing of the enterprise (Shams, 2009; Hsiang, 2014). Khan, Shah, and Rizwan (2021), using firm survey data from 21 countries published by the World Bank, concluded that financing constraints have a greater impact on incremental innovation than on radical innovation,

and thus bank financing plays a key role in promoting all types of innovation in developing countries. There is a significant positive correlation between the personal characteristics of the CEO (manager) and R&D investment, manifested in the CEO's work background, political connections, shareholding ratio, bargaining power, etc., especially in small-scale, low-profitability, and high-management-shareholding companies. With the expansion of the term, the effect of enhanced CEO management and control and CEO shareholding can promote corporate R&D investment. However, Wang and Sun (2018) found that the stronger the manager's ability to increase prices, the lower the innovation input. For small companies in the industry, market competition does not have the effect of stimulating R&D investment. In addition, factors such as intermediary financial factors, corporate governance, corporate characteristics, and management team heterogeneity in organizational risk appetite will also affect R&D investment behaviors of enterprises to varying degrees. Bottazzi et al. (2001) and Nunes et al. (2012) believed that the company's better financial flexibility (maintaining a lower debt ratio and higher cash holdings) would help promote the company's growth and long-term development. Billett and Garfinkel (2004) argued that the amount of financial flexibility of a company should be kept within a reasonable range. If it is overloaded, it may increase the opportunity cost and capital cost of the company, and even hinder the growth and development of the company. Serrasqueiro, MacasNunes, and Leitao (2011) found that cash flow and short-term debt, regardless of their level, will have a positive impact on the R&D intensity of SMEs. Long-term debt and government subsidies are only important at higher levels of long-term debt and government subsidies. The research on the internal financing constraints of R&D investment has been mainly aimed at already mature companies or industries, with a lack of data from new ventures. Lin, He, and Yang (2020) find that targeted easing (TE) policy, an unconventional monetary policy aimed at reducing the reserve requirement ratio (RRR) of specific financial institutions, was implemented to significantly reduce the financing constraint of small firms as measured by cash flow sensitivity. Khan, Shah, and Rizwan (2021) using data from a survey of firms in 21 countries published by the World Bank, determined that financing constraints have a greater impact on incremental innovation than on radical innovation, and thus bank financing plays a key role in promoting all types of innovation in developing countries.

Research Assumptions

The Impact of Entrepreneur Ability and Start-up Funds on Venture Risk Tolerance

Entrepreneur ability includes opportunity identification ability, operation management ability, learning ability, resource ability, and innovation ability. Identifying opportunities means identifying, grasping, and seizing opportunities, which requires both an eye to identifying opportunities and a firm embrace of the market. Operation management refers to the ability to manage the personnel of the enterprise and properly master the business, the more skilled the entrepreneur, the greater the possibility of positive cash flow maintenance, self-responsibility, as well as continuous operation and development. Learning ability

means the ability to acquire knowledge, persist in learning, and transform the knowledge into reality. Resource ability includes the ability to acquire human resources, capital resources, information resources, and technical resources for the team, and to deal with the acquired resources in a coordinated manner. Innovation is the most profound characteristic of entrepreneurs. An important element of a successful enterprise is the enhancement of innovation abilities that can make the enterprise more competitive, more tolerant of the fluctuations in the markets, internal and external policy changes, and more able to obtain business and information resources that can enhance the ability of the enterprise to resist risks and sustain development.

Based on the above analysis, the following assumptions are proposed:

Hypothesis 1: Entrepreneur ability has a positive impact on risk tolerance.

Hypothesis 1a: The ability to identify opportunities has a positive impact on risk tolerance.

Hypothesis 1b: Operational management ability has a positive impact on risk tolerance.

Hypothesis 1c: Learning ability has a positive impact on risk tolerance.

Hypothesis 1d: Resource management ability has a positive impact on risk tolerance.

Hypothesis 1e: Innovation has a positive impact on risk tolerance.

Start-up funds refer to the funds required for an enterprise to first run, or rerun, and are the first capital necessary for the entrepreneur team to carry out entrepreneurial activities. When a start-up team raises more start-up funds (more start-up funds, a large stock of liquidity, rapid fund scheduling, etc.), in addition to the necessary expenditure items, the remaining part of the start-up funds can be retained as working capital in case of unexpected events such as fund gaps, higher risk expectations of the team, thus increasing the ability of the new enterprise to be successful. Accordingly, the following assumptions are made:

Hypothesis 2: Start-up funds contribute to risk tolerance.

From a rational person's point of view, the stronger the ability of entrepreneurs, the more likely they are to participate in risk, and vice versa, the more likely they are to stay away from risks and adopt a conservative attitude. The stronger the entrepreneur's ability is, the more flexible s/he is to deal with in an emergency. If the enterprise has sufficient capital and sufficient trial and error reserves, the enterprise's risk-bearing ability will be strong. On the contrary, if the entrepreneur's personal ability is weak, the ability to deal with an emergency will be slow and the outcome will be poor. If the enterprise has a lack of start-up funds, the enterprise is very fragile and does not allow trial and error at all. Thus the enterprise's risk-bearing ability will be small.

Hypothesis 3: The interaction of entrepreneur ability with start-up funds has a positive impact on risk tolerance

Impact of Risk Tolerance on R&D Investments

The R&D investment index of this study includes two dimensions of investment willingness and investment intensity. Investment willingness refers to whether investors are willing to invest funds or capital into the enterprise. Investment intensity is also called "investment density," which refers to the

proportion of funds or capital that investors are willing to invest in the turnover. The greater the risk tolerance of start-ups, the more likely they are to survive and grow in changing markets and environments, the more willing investors are to invest in R&D for a bigger expected return, the more willing they are to invest. Conversely, the smaller the risk tolerance of start-ups, the less willing they are to invest in R&D. The greater the risk tolerance of start-ups, the higher the likelihood of becoming a "star enterprise" and the higher the proportion of investors' investment in R&D. On the contrary, the smaller the risk tolerance of start-ups, the lower the proportion of entrepreneurs' investment in R&D. The higher the willingness of investors to invest in R&D, the greater the willingness to increase the proportion of investment in R&D, and the greater the intensity of investment in R&D. Whereas the less the willingness of investors to invest in R&D, the lower the proportion of additional investment in R&D.

As above, risk tolerance has a catalytic effect on R&D investment willingness, and risk tolerance has a catalytic effect on R&D investment intensity, while investment willingness has a positive effect on investment intensity. The following assumptions are proposed:

Hypothesis 3: Risk tolerance has a positive impact on R&D investment.

Hypothesis 3a: Risk tolerance has a positive impact on R&D investment willingness.

Hypothesis 3b: Risk tolerance has a positive impact on R&D investment intensity.

Hypothesis 3c: R&D investment willingness mediates between risk tolerance and R&D investment intensity.

In summary, the theoretical model of this paper is shown in Figure 1.
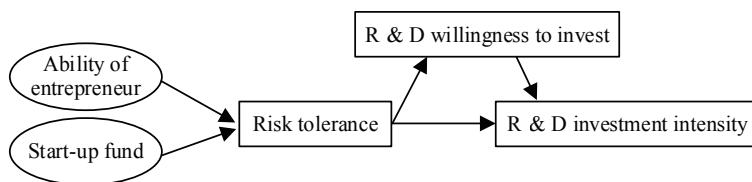
Figure 1. Theoretical Model

Research Methods

Questionnaire Design and Data Collection

By referring to previous scholars' research work, we designed a questionnaire by drawing on research dimensions of the entrepreneurial capabilities defined by Noble (1999), Chandler (1994), etc., referring to the measurement dimensions of the enterprise's risk tolerance proposed by Pan et al. (2013), Lu (2014), and research on R&D investment by Chen (2010) et al., using the Delphi method of multiple rounds of consulting experts to screen and supplement the core elements of entrepreneurship. As shown in Table 1, the questionnaire is divided into two parts. The first part contains the basic information of the entrepreneur, including gender, age, education, entrepreneur city, entrepreneur duration, industry field, enterprise size, type of enterprise, number and source of start-up funds. The second part measures the entrepreneur's ability, risk tolerance, R&D investment willingness, and R&D investment intensity by evaluating the entrepreneur's opportunity identification ability,

operational management ability, learning ability, resource ability, and innovation ability. The willingness and intensity of R&D investments are measured in terms of policy tolerance, the ability to withstand changes in the economic environment, the ability to withstand market fluctuations, the ability to access and strengthen political connections, the ability to access business and information resources, the profitability of the enterprise, the ability of the enterprise to operate, the ability of the enterprise to pay its debts, the ability of the enterprise to develop, the cash flow of the enterprise and the ability to withstand the losses of the enterprise.

Table 1　Structure of Questionnaire

Variables	Measurement item	Source of the scale
Basic information	age, education, entrepreneur city, entrepreneur duration, industry field, enterprise size, type of enterprise, quantity, and source of start-up funds	
Opportunity recognition capability	Ability to analyze potential market demand Ability to capture business opportunities Product creative development ability The ability to assess the impact of business opportunities on financial indicators The ability to assess the impact of business opportunities on non-financial indicators	Ma et al. (2014)
Operational management capability	Ability to improve business operations Ability to restructure business operations Ability to cooperate with business operations Ability to respond to business operations Ability to customize business operations Ability to innovate in business operations	Wu et al. (2010)
Learning capability	We have the ability to scan knowledge We have the ability to acquire knowledge We have the ability to use knowledge We have the ability to absorb knowledge	Jerez-Go´mez et al. (2005)
Resource capability	Ability to allocate resources based on organizational goals Ability to allocate resources based on resource characteristics Ability to allocate resources according to market orientation Ability to use resources to develop new technologies Ability to use resources to develop new products Ability to use resources to reduce production costs Ability to use resources to improve customer service	Ma et al. (2014), Dong (2014)
Innovation capability	The ratio of the product development budget to the number of employees The ratio of the process R&D budget to the number of employees	Santoro et al. (2017)
Risk tolerance	Capability to withstand policy, economic and environmental changes Capability to withstand market fluctuations Capability to access and strengthen political links Access to business and information resources Corporate profitability Capability to operate Corporate solvency Capability for enterprise development Cash flow of the enterprise The extent of ability to sustain start-up losses	Pan et al. (2013) Lu et al. (2014)
R&D willingness to invest	I plan to continue investing in new products in the future I will always try to strengthen R&D in the production and operation process I intend to continue to strengthen R&D investment	Chen et al. (2010)
R&D investment intensity	R&D investment as a percentage of turnover	

A total of 228 questionnaires were collected, including 222 valid questionnaires with blank items

and more than 95 percent of the same options, and 97.4 percent of them were valid. The details are shown in Table 2.

Table 2   Reliability and Validity Analysis of Variables

Variable name	Measured indicators	Variable abbreviation	Reliability and validity
AE (Ability of entrepreneurs)	Opportunity recognition capability	ORC	α=0.884 KMO=0.835
	Operational management ability	OMA	
	Learning ability	LA	
	Resource ability	RA	
	Innovation ability	IA	
RT (Risk tolerance)	Ability to withstand policy, economic and environmental changes	WEEC	α=0.915 KMO=0.900
	Ability to withstand market fluctuations	WMF	
	Ability to access and strengthen political links	ASPL	
	Access to business and information resources	ABIR	
	Corporate profitability	CP	
	Ability to operate	ATO	
	Corporate solvency	CS	
	Ability for enterprise development	AED	
	Cash flow of the enterprise	CFE	
	Extent of ability to sustain start-up losses	ESSL	
RDI (R&D investment)	R&D willingness to invest	RDWI	
	R&D investment intensity	RDII	

Reliability and Validity Analysis

The measuring dimensions of entrepreneur ability, risk tolerance and R&D investment of the entrepreneurs were extracted under the guidance of experts. In this part, there are 20 necessary items, the overall reliability is high (α=0.931, KMO =0.896), the factor load of each item of entrepreneur ability and risk tolerance is above 0.65, α value is above 0.85, KMO value is higher than 0.8. The overall reliability validity of the questionnaire is good.

Proven Studies

Descriptive Statistics

To investigate the entrepreneurs themselves and the basic conditions of the start-ups, we focused on the sex, age, education, length of the start-up and its size, type, and start-up funds. The entrepreneurs surveyed were mainly in Sichuan province (163), Beijing (28), and Shanghai (26), and the start-ups involved were doing business in the Internet, fast consumer goods, wholesale and retail, furniture and clothing, education and training, manufacturing, catering, real estate, consulting and others.

The details are shown in Table 3.

Table 3　Descriptive Statistics of Sample Characteristics

Sample characteristics	Variable encoding	Type	Frequency	Percentage
Gender	0	Male	140	63.06
	1	Female	82	36.94
Age	0	18-30 years	130	58.56
	1	31-40 years	58	26.13
	2	41-50 years	26	11.71
	3	51-60 years	8	3.6
Education	0	High School and below	16	7.21
	1	Specialist	40	18.02
	2	Undergraduate	110	49.55
	3	Master and above	56	25.23
Length of start-up	0	Within 1 year	40	18.02
	1	1-3 years	68	30.63
	2	3-5 years	52	23.42
	3	5-10 years	20	9.01
	4	More than 10 years	42	18.92
Enterprise size	0	Micro enterprises (within 5 persons)	110	49.55%
	1	Small businesses (5-50 persons)	98	44.14%
	2	Medium-sized enterprises (51-499)	10	4.5%
	3	Large enterprises (over 500 persons)	4	1.8%
Type of enterprise	0	Private enterprise	218	98.2
	1	State-owned enterprises	4	1.8
Start-up funds	0	50,000 and below	94	42.34%
	1	50,000 to 500,000(inclusive)	90	40.54%
	2	500,000-1 million (inclusive)	18	8.11%
	3	100-3 million (inclusive)	14	6.31%
	4	300-5 million (inclusive)	2	0.9%
	5	More than 5 million	4	1.8%

The statistics of entrepreneurs with different sample characteristics are classified, and the results show that: in terms of gender, the proportion of male entrepreneurs who have been in business for more than five years is higher than that of female, and the proportion of female operated enterprises that are small and micro enterprises is higher than male. The start-up funds of female entrepreneurs are mainly concentrated in less than 1 million, with a higher proportion of personal assets and a lower debt ratio, but female entrepreneurs believe that obtaining adequate financial support is more important for improved corporate risk tolerance. Male entrepreneurs have greater differences in start-up capital, and the debt ratio is relatively high. Male entrepreneurs' management leadership, ability to seize opportunities, communication and coordination, and ability to deal with social relations are slightly stronger than female entrepreneurs. Companies founded by male entrepreneurs are able to

withstand changes in policies and economic environments. The ability of enterprises to make profits and the ability to pay off debts are significantly higher than those created by female entrepreneurs, and male entrepreneurs can tolerate higher business losses. As the age of the entrepreneurs increase, basic professional knowledge, communication, coordination and handling of social relations, and the ability to acquire resources gradually increased, and the degree of bearing entrepreneurial losses. With increased education, the amount of start-up funds for entrepreneurs gradually increased, and the channels for obtaining start-up funds became more diverse, and entrepreneurs' capabilities gradually improve (We cannot predict the future.). Entrepreneurs with a college degree are generally less willing to invest, but when they do, research and development investments in new technologies and services have the highest intensity. From 1 to 10 years of entrepreneurship, the comprehensive capabilities of entrepreneurs improve, but the evaluation of their entrepreneurial capabilities decreases after more than 10 years. Similarly, within 10 years of entrepreneurship, the degree of business losses that can be sustained increases, but after ten years, the ability to bear losses declines to some extent. Entrepreneurs who have been in business for 1 to 3 years are more willing to invest in the research and development of new products, technologies, and services, and have greater R&D intensity. With the expansion in the size of their enterprises, the ability of entrepreneurs increased gradually, the degree of bearing corporate losses also soared, and the willingness to invest in new products, new technologies, and new services gradually increased as well. The most significant increase in R&D investment willingness and intensity is among the medium and large enterprises.

Correlation Analysis

Using SPSS 24.0 software to describe and analyze the independent variables, dependent variables, and adjusting variables, the correlation coefficients of start-up funds, opportunity identification ability, operation management ability, learning ability, resource ability, innovation ability, and risk-bearing ability is greater than 0.28, and significant value is less than 0.01, indicating that there is a correlation between start-up funds, entrepreneur ability, and risk-bearing ability. The correlation coefficient between R&D investment willingness and R&D investment intensity is 0.482, and significant value is less than 0.01, indicating that there is a correlation between R&D investment willingness and R&D investment intensity. The details are shown in Table 4.

Hypothetical Test

We verified the impact of entrepreneur ability and risk tolerance on R&D investment by using SPSS 24.0 linear regression for hypothesis checking. Model 1 and Model 2 verified the impact of entrepreneur ability on risk tolerance. Using risk tolerance as a dependent variable, the regression coefficient of entrepreneur ability was 0.619, which was significant at 0.001, indicating that entrepreneur ability has a positive effect on risk tolerance, assuming H1%. Also, identification ability, operation management ability, learning ability, resource ability, and innovation ability were linearly regressed, returning regression coefficients of 0.527, 0.541, 0.448, 0.545, and 0.498, respectively.

Table 4　Descriptive Statistics and Correlation Analysis of Main Effect

	Mean value	Standard deviation	Start-up Funds	ORC	OMA	LA	RA	IA	RDI	RDWI	RDII
start-up funds	1.88	1.059	1								
ORC	3.473	0.7915	0.099	1		.					
OMA	3.36	0.892	0.295**	0.561**	1						
LA	3.644	0.6987	0.238*	0.562**	0.660**	1					
RA	3.572	0.7563	0.062	0.732**	0.635**	0.595**	1				
IA	3.61	0.876	0.176	0.654**	0.460**	0.545**	0.715**	1			
RDI	3.413	0.6512	0.285**	0.527**	0.541**	0.448**	0.545**	0.498**	1		
RDWI	3.77	0.786	0.185	0.202*	0.096	0.211*	0.143	0.171	0.290**	1	.
RDII	2.91	1.023	0.133	0.182	0.215*	0.203*	0.173	0.214*	0.322**	0.482**	1

** At the 0.01 level (double tail), the correlation was significant.
 * at the 0.05 level (double tail), the correlation was significant.

All were significant at less than 0.001, indicating that opportunity identification ability, operation management ability, learning ability, resource ability, and innovation ability had a promoting effect on risk tolerance, providing evidence that hypotheses 1a, 1b, 1c, 1d, and 1e were valid.

We also verified the promotion effect of start-up funds on risk tolerance. The stratified regression results showed that the regression coefficient was 0.285, and the significance coefficients were all less than 0.01, indicating that start-up funds had a positive effect on risk tolerance, providing evidence that Hypotheses 2 is valid.

To analyze the effect of the interaction between entrepreneur ability and the start-up funds on risk tolerance, we standardized the start-up funds and constructed the interaction item to carry on the stratified regression, and the results show that the interaction between the entrepreneur ability and the start-up funds has a promoting effect on risk tolerance, supporting H12%. It is convenient to clearly analyze the interaction mechanism between entrepreneur ability and the start-up funds and draw the conclusion that high start-up funds enhance the ability of the entrepreneur to bear risks, while low start-up funds weaken the ability of the entrepreneur to bear risks. The details are shown in Figure 2.

To verify the impact of risk tolerance on R&D investment, Model 3 and Model 4 verified the impact of risk tolerance on R&D investment willingness. The results show that risk tolerance has a catalytic effect on R&D investment willingness, meaning that the stronger the risk tolerance, the stronger the willingness of entrepreneurs to invest in R&D, supporting H3A. Model 5 and Model 6 verified the influence of risk tolerance and R&D investment willingness on R&D investment intensity. The regression coefficients of R&D investment willingness and risk tolerance were 0.322 and 0.482, respectively, and the significant coefficients were all less than 0.001, indicating that the regression effect was significant. Risk tolerance and R&D investment willingness promoted R&D investment intensity. Thus, risk tolerance positively affects R&D investment, and R&D investment willingness plays a partial intermediary role between risk tolerance and R&D investment intensity, supporting H3, H3a, H3b, and H3c.
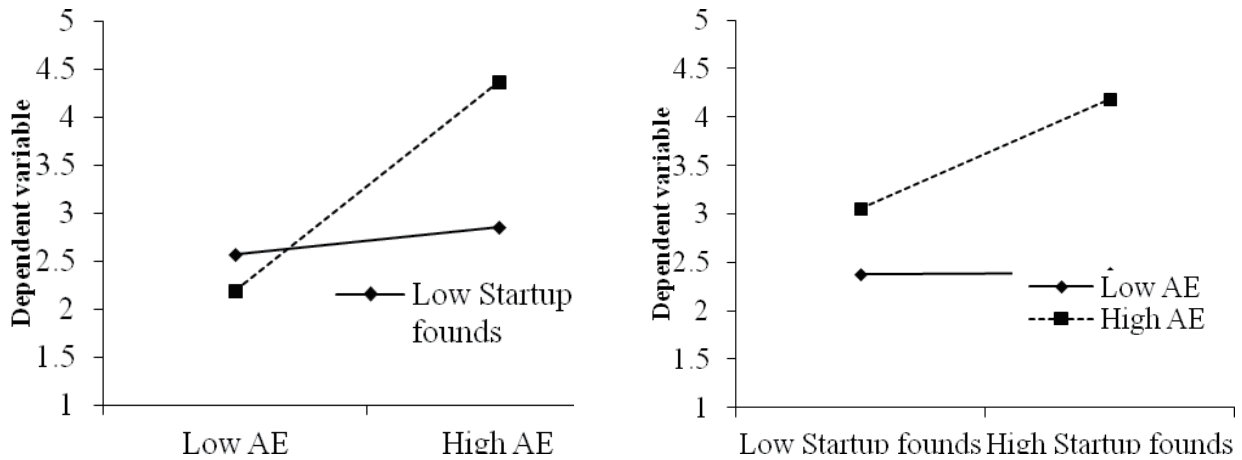
Figure 2. Interactive Effect Diagram

The details are shown in Table 5.

Table 5　Layered Regression Results

	RT		RDWI		RDII		
	Model1	Model2	Model3	Model4	Model5	Model6	Model7
Control variables							
Gender	-0.011	0.047	-0.033	-0.030	0.002	0.005	0.017
Age	0.128	0.142	0.001	-0.028	0.000	-0.034	-0.022
Education	0.169	0.085	0.079	0.041	0.107	0.063	0.046
Start Time	-0.052	-0.071	0.031	0.043	-0.127	-0.113	-0.131
Enterprise size	0.362***	0.157	0.223	0.142	0.264	0.169	0.110
Independent variables							
AE		0.619*** (8.227)					
ORC		0.527*** (6.477)					
OMA		0.541*** (6.721)					
LA		0.448*** (5.225)					
LA		0.545*** (6.778)					
IA		0.498*** (5.997)					
start-up funds		0.285** (3.110)					
RT				0.290** (3.165)		0.322*** (3.556)	0.199* (2.318)
RDWI						0.482*** (5.997)	0.425*** (4.941)
Interaction item							
EA x start-up funds		0.472**(5.594)					
Simulation statistics							
Adjusted R²	0.397	0.431	0.024	0.057	0.045	0.094	0.250

	RT		RDWI		RDII		
	Model1	Model2	Model3	Model4	Model5	Model6	Model7
R²		0.039**		0.040	0.089	0.055	0.154
F value	5.010	11.102	1.53	2.10	2.046	2.906	6.242

** Significant at level 0.001 (double tail)
** Significant at level 0.01 (double tail)
 *Significant at 0.05 level (double tail)

Accordingly, the results of this validation are consistent with the assumptions presented, as shown in Table 6:

Table 6　Hypothesis Test Results

Assumption number	Assumption content	Validation results
H1	The entrepreneur's ability has a positive effect on the risk tolerance	Establishment
H1a	The ability to identify opportunities has a positive effect on risk tolerance	Establishment
H1b	Operational management has a positive effect on risk tolerance	Establishment
H1c	Learning ability has a positive effect on risk tolerance	Establishment
H1d	Resource ability has a positive impact on risk tolerance	Establishment
H1e	Innovation ability has a positive effect on risk tolerance	Establishment
H2	Start-up funds can promote risk tolerance	Establishment
H1/2	The interaction between entrepreneur ability and start-up funds has a positive effect on risk tolerance	Establishment
H3	Risk tolerance has a positive effect on R&D investment	Establishment
H3a	Risk tolerance has a positive effect on R&D investment willingness	Establishment
H3b	Risk tolerance has a positive effect on R&D investment intensity	Establishment
H3c	R&D investment willingness plays an intermediary role between risk tolerance and R&D investment intensity	Establishment

Research Conclusions and Prospects

Research Conclusions and Theoretical Contributions

Through the questionnaire survey of 222 entrepreneurs, the influence factors of risk tolerance were analyzed from the perspective of entrepreneur ability, and the relationship between risk tolerance and R&D investment was empirically studied. The conclusions of this study mainly focus on the following three aspects:

First, the ability of entrepreneurs and good start-up funding have a positive impact on the risk tolerance of start-ups. The stronger the ability of the entrepreneur, the more the knowledge and skills of the enterprise will be expanded, the more sensitive it will be to identifying venture risks and the more flexible the application and allocation of the entrepreneur's resources will be. Start-up funds can enhance the solvency of enterprises and the ability to obtain business information resources, establish a better cash flow, and thus enhance the risk tolerance of enterprises.

Second, the interaction between entrepreneur ability and start-up funding has a positive effect on

the risk tolerance of start-ups. The stronger the ability of entrepreneurs, the higher the start-up funds, the stronger the risk tolerance, and vice versa. When entrepreneurs have strong ability and sufficient start-up capital, enterprises can resist policy or market interference, which can reduce losses through resource integration and effective operation. On the contrary, if entrepreneurs have poor ability and less start-up capital, enterprises will not be able to meet the challenge of survival and face the danger of bankruptcy. The interactive effect of the entrepreneur's ability and the start-up funding shows that high start-up funds enhance the ability of the entrepreneur to promote the ability to bear risks.

Third, the enterprise's risk tolerance is affecting its R&D investment in developing new products, technologies, and services. Enterprise risk tolerance can promote R&D investment willingness and R&D investment intensity, respectively. The stronger the risk-bearing ability of the enterprise, the stronger the ability of the enterprise to bear the changes in policies and economic environments, the better the solvency and capital flow of the enterprise, the more the enterprise managers can operate according to their existing standards, and have the time and energy to analyze the industry situation, grasp the future development trends, formulate the strategies for the enterprise's future development, and produce the willingness to carry out the research and development of new products, new technologies, and new services.

Theoretical Contributions and Prospects

This study explored the relationship between risk tolerance and R&D investment based on the perspective of entrepreneur ability. It can provide a reference for improving entrepreneur ability and enhancing the risk tolerance of start-ups from the perspective of entrepreneurs. There are limitations as follow. First, it uses only the entrepreneur's ability and the start-up funds to carry on the risk tolerance ability analysis, and only analyzes the enterprise's internal characteristics to risk tolerance ability influence, without considering policy safeguards, industry markets, and other external influences and pressures of the macroscopic environment. Second, because the harvested data involves various fields and scattered industries, the sample size of individual industries is relatively small; thus the conclusions may not be universal in some fields or industries. Therefore, in our future research, we will continue to increase the strength of our questionnaire distribution, industry classification analysis, and strive to develop more universal and constructive theories and suggestions.

We propose optimized countermeasures from three subjects: governments, enterprises, and entrepreneurs. First, governments should strengthen policy guidance and risk control for SMEs, improve the institutional mechanisms for enterprise fundraising and financing, and organize entrepreneurial capacity enhancement training. Second, enterprises should enhance their risk tolerance capacity in two aspects, risk control and risk resolution, formulate strict rules and regulations, improve corporate governance and risk control mechanisms, assess the risks of major decisions, and regularly evaluate and control all aspects of enterprise risks to ensure normal and effective production and operation, financial management, and transaction activities, and avoid serious risks arising from mistakes in key processes or links. Third, entrepreneurs should strengthen their learning and develop

sufficient entrepreneurial knowledge in advance, and strengthen their own ability to correctly analyze market demands. At the same time, in the early stage of entrepreneurship, they should choose a good entrepreneurial project, form a good entrepreneurial team, obtain sufficient financial support, build a good business relationship network, and predict possible obstacles, setbacks, and precautions.

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The Historical Fiction Based on True Stories: An Analysis of the Menghui Gushu by Huang Jianhua with the Aid of Historical Records and Archaeological Objects of Art

Tang Lin*

Sichuan Academy of Social Sciences

Abstract: The *Gushu Chuanqi* [Legend of Ancient Shu] trilogy is historically grounded, although it is largely fictional. Five characteristics of the society represented in the trilogy, i.e., walled cities, sacred statues, silk fabrics, burials, and pottery, were examined with the aid of related historical records and archaeological objects of art unearthed in Sichuan. This paper made a comparative study of these things with their respective textual descriptions in the *Menghui Gushu* [Ancient Shu Revisited in the Dream], the first volume of the *Gushu Chuanqi* [Legend of Ancient Shu] trilogy by Huang Jianhua. The results support the assertion that the trilogy is not a free interpretation of history but historical fiction based on true stories.

Keywords: ancient Shu/ancient Sichuan, historical records, archaeological objects of art, comparative study

*   Tang Lin, Sichuan Academy of Social Sciences.
     Correspondence concerning this article should be addressed to Tang Lin, Sichuan Academy of Social Sciences, Chengdu. Email: 173586323@qq.com

The *Gushu Chuanqi* [Legend of Ancient Shu] trilogy, which was published in 2021 by Sichuan Fine Arts Publishing House, consists of the *Menghui Gushu* [Ancient Shu Revisited in the Dream], the *Jinsha Chuanqi* [The Legend of Jinsha], and the *Wuding Beige* [An Elegy to Five Strong Men]. This lengthy trilogy, involving numerous historical figures, is the first full-length novel on the history of ancient Shu, which spanned a thousand years and went through five dynasties from Cancong, Baiguan, Yufu, and Duyu, to Kaiming (partially overlapping with the reign of Lord Bing, the first king of the Ba state). Admittedly, the trilogy is largely fictional, and is based on a few historical records, such as *Shuwang Benji* [Biographies of the Kings of Shu][1] by Yang Xiong of the Western Han Dynasty (202 BC–AD 8), and *Huayang Guo Zhi* [Chronicles of Huayang] by Chang Qu of the Eastern Jin Dynasty (317–420). Although there is not much relevant information, except for some vague words in the historical records (Huang, 2021a, pp. 514–515).[2] Nevertheless, Huang's narrative (particularly descriptions

Figure 1. Cover of the *Menghui Gushu* [Ancient Shu Revisited in the Dream] by Huang Jianhua

concerning the social customs and objects of ancient Shu) did not come out of thin air, but was inspired by by archaeological discoveries in Sichuan over the ages. The trilogy has had many positive reviews. For example, some say that it fills the vacuum in the historical writing of ancient Shu. As a long-term researcher of the history of fine arts (the history of fine arts in Sichuan in particular), I am to share my view on the *Gushu Chuanqi* [Legend of Ancient Shu] trilogy, with a special focus on Volume one *Menghui Gushu* [Ancient Shu Revisited in the Dream] with the aid of related historical records and archaeological objects of art.

The "*wenxian*" [literature] refers to pieces of writing on a particular subject, while "*shiliao*" [historical source] refers to things that can be used as a basis for historical research and discussion. Therefore, the compound "*wenxian-shiliao*" [historical record] in Chinese refers to written sources for historical research and discussion.

Archaeology of fine arts, which is about ancient history, aims to rebuild the ancient society and culture by using various artworks as physical materials. This branch of archaeology covers archaeological objects of art from the Paleolithic through various historical eras. What do fine arts refer to in this paper? Fine arts here should be understood in a traditional sense, that is,

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[1] *Shuwang Benji* [Biographies of the Kings of Shu], also called Shu Benji or Shuji, is a chronicle of the ancient state of Shu in present-day Sichuan. The book is believed to have been compiled by Yang Xiong (53 BC–AD 18) of the Western Han Dynasty. The book was already lost during the Song period (960–1279), but fragments of it are quoted in some literary works by men of letters of the Tang and Song dynasties, with over a score of quotes coming down the ages.

[2] Regarding the starts and durations of these dynasties, there are only academic deductions, which can be found in the postscripts of the trilogy by Huang Jianhua (2021a, 2021b).

"general fine arts," which fall into four main categories: painting, calligraphy, architecture, and sculpture. Physical objects are the concrete material existence of the four categories.

Since there are countless historical records and archaeological objects of art related to ancient Shu, it is impossible to mention them all. This paper only focuses on five types, i.e., walled cities, sacred (bronze) statues, silk fabrics, burials, and pottery, to analyze textual descriptions in the *Menghui Gushu* [Ancient Shu Revisited in the Dream], the first volume of the *Gushu Chuanqi* [Legend of Ancient Shu] trilogy. All of the five types belong to "general fine arts." Walled cities and burials are of the architectural art category; sacred (bronze) statues, silk fabrics, and pottery are of the arts and crafts category (or rather, metal arts, textile arts, and pottery arts) (Tang, 2015). Chronologically, the five types came from three historical periods: the reign of the House of Cancong of Shu (presumed to be the same period as that of Emperor Ku, Yao, and Shun, after the Yellow Emperor), the reign of the House of Yufu of Shu (presumed to have lasted through Xia, Shang, and Zhou dynasties), and the reign of the House of Lord Lin of Ba.

Walled Cities

A walled city, referring to a large human settlement enclosed by a wall, is an umbrella term here for cities and towns in ancient China. In ancient times, walled cities were strongholds of political rule, and also representations of the economic, cultural, and technological achievements of the times. In the era of slavery, when kingship was paramount, a state's capital was its political center and had the largest urban area. The earliest known cities in China appeared on the land of Qi (present-day Shandong) of the Longshan culture between 4,000 and 4,600 years ago. Among them was Chengziya, an archaeological site in Longshan town under the administration of Zhangqiu city, Shandong province (Li, 1992, p. 628).

In the *Gushu Chuanqi* [Legend of Ancient Shu] trilogy, Cancong, founder of the Shu state, headed the migration to the plain from the Min River valley in Sichuan. When they reached the confluence zone of rivers, they decided to settle on higher ground nearby. It was at that time that Cancong made a major decision, that is, to build a city. In Huang's imagination, the city was built under Cancong's leadership as follows:

> Cancong decided to build a city. So, his men drew on local resources around their settlement and rammed down the earth hard to build a high city wall. This large earthen city was in a square shape outlined by a tall and wide wall, which was as magnificent as a dike. The tribe lived in the earthen city, and could make full use of its multiple functions to defend themselves against wild animals and prevent floods. More importantly, compared with scattered settlements in the wilderness, a clustered settlement in a walled city could better unite people to accomplish big causes, such as the later establishment of the Shu state (Huang, 2021a, p. 48).

The narrative is echoed by some historical records. In "Kao Gong Ji" [Records of Examination

of Craftsman] of *Zhou Li* [The Rites of Zhou], a classic work compiled in the pre-Qin period, there is a description of the layout of the king's capital:

The craftsmen built the city as a square of nine *li* per side and each side with three gates. Within the city, there were nine north-south arteries and nine east-west boulevards. The roads of the north-south arteries measured nine axle-lengths across. On the left was the ancestral temple; on the right, the altars to soil and grain. In the front was the royal court, and behind it, the marketplace. Both the marketplace and the royal court measured 100 steps (c. 140 m) per side.

Also, there is a mention of a city building in *Wu Yue Chunqiu* [Spring and Autumn Annals of Wu and Yue], an unofficial history by Zhao Ye from the late Eastern Han Dynasty (25–220). It reads, "Gun built a citadel in order to guard the ruler, and constructed an outer city wall to give the people somewhere to live." Admittedly, these records date back over 1,000 years from the era of Cancong, and are not about the ancient Shu state. Still, they can serve as useful guidelines.

Archaeological objects of art in this regard are abundant in Sichuan. So far, six prehistoric city sites have been found in Sichuan, and all are located in the Chengdu Plain. They respectively are the Baodun site (at present-day Baodun village, Longma township, Xinjin district, Chengdu), the Mangcheng site (at present-day Mangcheng village, Qingcheng township, Dujiangyan city, Chengdu), the Yufu site (at present-day Yufu village, Wanchun town, Wenjiang district, Chengdu), the Pixian site (at present-day Gucheng village, Gucheng town, Pidu district, Chengdu), as well as the Shuanghe site and the Zizhu site (at present-day Shuanghechang, Shangyuan township, and present-day Zizhu village, Liaoyuan township under Chongzhou city, Chengdu) (Ma, 2003, p. 112). The absolute ages of the six prehistoric city sites range from about 2,875 to 4,500 years ago (Meng, 1988), and they all belong to the Baodun culture (Jiang et al., 1997). Walled cities of this period in the Ba-Shu region had similar patterns, with rammed walls in irregular rectangular shapes (except the site of Yufu, whose wall is in an irregular polygonal shape). From the six city sites, it can be inferred that prehistoric cities in Sichuan tended to be built on higher ground near rivers, that the longest side
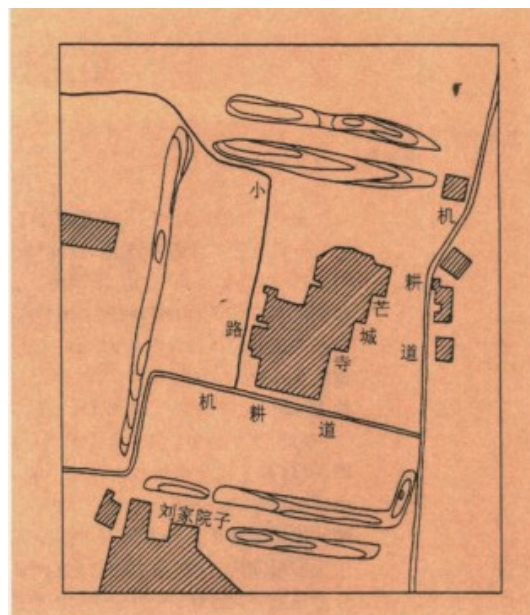

Figure 2. Plan of the Mangcheng site, a prehistoric city in Sichuan province[①]

① Source: *Prehistoric Chinese Cities* by Ma Shizhi (2003, p. 115).

of their rectangular wall was often parallel to the river course and the higher ground trend, and that the urban outlines were nearly rectangular or square (Zhang, 2015, p. 32). During this time, "western Sichuan was the rainiest area," and "flash floods wreaked havoc across the Shu state, forcing people to live like fish in the river," wrote Chen Shen in *Shi Xi* [Stone Rhinoceros]. Given that, the above architectural patterns were for flood prevention purposes. It should be noted that it was not until many centuries after the reign of Cancong that Li Bing, administrator of Shu Prefecture, built the Dujiangyan project to tame the floods. In Cancong's era, the Chengdu Plain was vulnerable to flooding.

The exact location of the ancient city built by Cancong on the Chengdu Plain remains unknown, but one thing for sure is that the ancient city has all of the above characteristics. Considering the historical fact that Cancong of Shu led his people to the plain by traveling down the Min River, his city was probably built in the area of present-day Dujiangyan in Sichuan. It happens that there is the site of a prehistoric city called Mangcheng in Dujiangyan. The Mangcheng site is located at Mangcheng village, Qingcheng township, some 12 kilometers south of downtown Dujiangyan. The site is a slightly irregular rectangle (10° east of north). The inside of the city is higher than the outside by about 0.3 centimeters. The city consists of two parts, namely, the outer city and the inner city, each of which is enclosed by a wall. The outer city is about 360 meters long from north to south, and 340 meters wide from east to west, covering an area of about 120,000 square meters; the inner city is about 290 meters long from north to south, and 270 meters wide from east to west, covering an area of about 78,000 square meters. The existing outer wall has four sections, i.e., the 238 meters north section, the 36 meters east section, the 224 meters south section, and the 224 meters west section. The existing inner wall is 8–13 meters in width, and 1–1.2 meters in height (Wang & Jiang, 1996). Different from later wall construction methods, their construction method involved piling up rammed earth into a slope-shaped wall. The wall was built of rammed earth on flat ground in a sloped shape. According to Duan Yu, a historian, the prehistoric city site at Mangcheng village was a crucial place, where water from the upper course of the Min River was channeled to the Chengdu Plain for irrigation, and its era also roughly coincided with the time when Cancong and Yufu migrated from the Min Mountains to the Chengdu Plain in historical records.

In short, Huang's narrative of city-building is historically grounded. Also, Huang's narrative highlights two key points on city building in the early years of Shu: a) build a high and strong wall to prevent floods according to the trend of the nearby rivers, and b) build a city or town on higher ground near the confluence zone of rivers according to the local terrain.

Sacred Statues

According to the *Xiandai Hanyu Tujie Cidian* [An Illustrated Dictionary of Modern Chinese Language], which was compiled by Shuoci Jiezi Cishu Yanjiu Zhongxin [Center for

Word Interpretation and Dictionary Studies] and published by Sinolingua in 2017, the Chinese term "*shenxiang*" [sacred statue] has two meanings: a) effigy of the deceased (old use), and b) portrait or statue of gods/buddhas.

In order to dispel the hatred between tribes and unite the people, King Yufu (the second king of Shu after Cancong) decided to cast sacred statues of Cancong and numerous dead tribal chiefs. In this case, "sacred statue" refers to the effigy of the deceased.

> King Yufu asked craftsmen to cast (bronze) statues of King Cancong and numerous dead tribal chiefs to form a group of sacred statues. This vast project was something unprecedented…The Shu craftsmen, in a fever of excitement, gave full play to their imagination and worked hard in cooperation with a due division of labor. Soon, they completed the first statue of King Cancong in an imperial robe and crown in the middle of worshipping the deities. The statue highlighted his grave and dignified bearing. Then, a second statue was cast, featuring protruding eyes. Following that, the craftsmen carefully conceived the images of numerous dead tribal chiefs, with some wearing hats, some braids, and some hairpins, forming a group of vivid statues with different looks and in varied postures. It took months to complete the design and casting (Huang, 2021a, p. 317).

Relevant information is easy to find in historical records. According to "Shan Quan Shu" of *Guangzi*, "Tang of Shang minted coins with metal from the Zhuang Mountain." The Zhuang Mountain refers to a copper mountain in Yandao, and is now the copper mine in Yingjing. Whether this quote is true remains to be proven, but what is certain is that Yandao was known to the Central Plains for its copper deposits. According to "Shu Zhi" [Records of Shu] of *Huayang Guo Zhi* [Chronicles of Huayang], "There are many precious deposits in Sichuan, such as copper, iron, lead, tin, and hollow azurite." Both lead and tin were important raw materials for making bronze. Hollow azurite was probably the principal raw material used by people in the ancient Ba-Shu region to make bronze. In the tenth volume of *Bencao Gangmu* [Compendium of Materia Medica] by Li Shizhen, there is a quote from *Mingyi Bielu* [Supplementary Records of Famous Physicians]:

> Hollow azurite occurs naturally with copper in the valleys of Yizhou (present−day Chengdu, Sichuan) and in the mountains of Yuexi (present−day Liangshan, Sichuan). It is produced by weathering copper ore deposits. It has a "hollow heart" and normally, but not necessarily, appears in the third lunar month. It can be mixed with copper, iron, lead, and tin, to make certain metallic substances.

There is no shortage of archaeological objects of art made of bronze in Sichuan, which can be exemplified by a group of bronze sculptures unearthed from Sanxingdui. In 1986, local workers accidentally found sacrificial pits containing a large number of bronze sculptures dating back to the Shang Dynasty over 4,000 years ago. Bronze sculptures found in the first and second sacrificial pits included human figures, human heads, human faces, human-faced masks, and animal-faced masks. They have different shapes and postures, such as a kneeling

figure, a standing figure, a half-length figure in a beast-headed crown, a human figure with a bird's claw-shaped feet, a small kneeling figure holding a *zhang* blade, a kneeling figure on a horn-shaped base with a *zun* (wine vessel) on top of the head, and a large sacred tree. There were a total of 242 bronze sculptures, including eight human figures, 57 human heads, 34 masks, 109 pairs of eyes, and 34 animals.[①] They are by far the largest group of bronze sculptures in China, both by number and by shape (Yao, 2004).

Figure 3. A bronze mask with protruding eyes from the Shang-Zhou period at the Sanxingdui Museum in Deyang, Sichuan

In terms of craftsmanship, the exquisite bronze sculptures of Sanxingdui show that ancient Shu people excelled at bronze casting. As early as the late Shang Dynasty, they had already mastered two bronze-casting processes: separate casting and integral casting, and also began to use methods, such as brazing, hot patching, and riveting. They did this a few hundred years earlier than the people in the Central Plains (Xing & Zheng, 1989). Their superb casting techniques and procedures reflect the advancement of metal smelting and casting. In terms of design, most of the bronze figures, heads, and masks of Sanxingdui were cast realistically. These sculptures, realistic yet larger than life, highlight the diversity, completeness, and artistry of bronze design of that time. Some bronze figures are so lifelike that one can tell their tribes and classes by their distinct facial features, hairstyles, and clothing. Some bronze figures are more expressive and exaggerative. For example, there is a huge human face with protruding eyes, a curved and elongated mouth, and big stretching ears, creating an exceptionally grotesque and overwhelmingly awe-inspiring vibe. Others are a combination of realism and distortion, with finely chiseled features for vivid texture, and a few elements of exaggeration for artistic appeal. They are both concrete and abstract, realistic and romantic, powerful and mysterious, as well as man-like and supernatural. In terms of decorative art, the decorative patterns on the bronzes can be divided into two types: animal-shaped patterns and geometric patterns (Chen, 1990). According to Duan Yu (1991), judging from their cultural origin, these bronze sculptures should be the images of the ruling group of the ancient Shu state headed by King Yufu.

Evidently, the above narrative by Huang Jianhua is based on the bronze sculptures unearthed from Sanxingdui. In fact, bronze sculptures of Sanxingdui were already the theme of Huang's

① Source: Contrastive Table of Bronze Vessels Unearthed from Pit 1 and Pit 2 of Sanxingdui and Those from the Sacrificial Zone of Jinsha in "Jinsha Yizhi Jisiqu Chutu Yiwu Yanjiu" [Researches on the Artifacts Unearthed from the Sacrificial Zone of Jinsha Site] by Shi Jinsong (2011).

early publications, such as *Sanxingdui: Zhenjing Tianxia De Dongfang Wenming* [Sanxingdui: An Oriental Civilization That Shocked the World] and *Sanxingdui* (Korean version).

Silk Fabrics

Silk fabrics refer to textiles made of natural silk (mainly mulberry silk, partially wild silk, and cassava silk). In ancient times, farming and sericulture were essential for a state and its people to grow rich and strong, as silk fabrics had long been the nobility's main material for clothing and an important export. During the Three Kingdom's period, brocade, a special silk product made in the state of Shu, was deemed a major strategic material by Zhuge Liang, chancellor of Shu.

The term "silk fabrics" frequently appears in Huang's *Menghui Gushu* [Ancient Shu Revisited in the Dream] to help depict how Xiling, wife of Cancong, popularized sericulture among women of her tribe, and spread it to other tribes and people on the plain for a bigger harvest. For space reasons, just one example is given below:

In preparation for this grand sacrificial rite (after migration to the plain), Xiling (wife of Cancong) hunted out a newly made silk gown for Cancong, washed it clean, and embroidered a cloud pattern beneath the existing dragon−and−horse pattern, making the gown even more gorgeous. As soon as the tribe moved to the plain, Xiling began to popularize sericulture among women of her tribe. The fertile land and humid climate created favorable conditions for mulberry growth on the plain. Tender mulberry leaves made sure that silkworms were well−nourished and that their cocoons were particularly full. Subsequently, silk fabrics made of such cocoons were exceptionally beautiful and lustrous. Sericulture soon became a novelty to smaller tribes in the vicinity, and more and more people came to learn the technique from the Shushan tribe. Thus, sericulture quickly spread across the plain (Huang, 2021a, p. 317).

The development of sericulture in Sichuan is well documented. The Sichuan Basin, along with its surrounding areas (known as the state of Shu in ancient times), has a long history of sericulture and silk production, and is one of the birthplaces of China's silk culture. That explains why the Shu state is also known as the "ancient state of Cancong," meaning an ancient state ruled by God of the Bluegreen Clothes/Sericulture. The emergence of the Ba-Shu civilization was marked by sericulture and silk production. As early as remote antiquity, the Shu people had already learned sericulture, silk reeling, and brocade weaving. According to *Shuowen Jiezi* [Discussing Writing and Explaining Characters], the Chinese character "蜀" [*shu*] means "a silkworm on a '*kui*' [mulberry] leaf." The interpretation of "*kui*" as mulberry is given in *Erya*, the first surviving Chinese dictionary. As it is said in "Dong Shan, Odes of Bin" of the *Book of Poetry*, "Creeping about were the caterpillars, all over the mulberry grounds." These historical records document that the state of Shu (ancient Sichuan) derived its name from sericulture and that sericulture originated in the state of Shu (Fu, 2006, p.

41). In the late Neolithic, the Shushan tribe and the Cancong tribe in the state of Shu were known for their sericulture. Legend has it that it was Fuxi that discovered wild silkworms on mulberry leaves when he "found things for consideration at a distance in things in general" in present-day Langzhong, Sichuan. The mulberry Mulberry tree was deemed the sacred tree of the estate of Leizu, a legendary Chinese empress and wife of the Yellow Emperor. Leizu was also from the Xiling tribe. According to tradition, she domesticated wild silkworms previously discovered by Fuxi in a grove of mulberry trees, and later initiated a silk culture by inventing silk reel and silk loom in China. Leizu's native place was in present-day Yanting county (Sichuan), which is less than 100 kilometers away from Langzhong as the crow flies. Because of Fuxi's discovery of wild silkworms on mulberry leaves in Langzhong (near Yanting) and the "Silkworm Mother" Leizu's domestication of wild silkworms in a grove of mulberry trees in Yanting, Yanting became the source of Chinese silk culture and the starting point of the (Northern and Southern) Silk Road. The legend of Matou Niang (lit. "woman with a horse head") gives another explanation regarding the beginning of sericulture, raw silk reeling, and silk and brocade weaving in Sichuan. Her poignant story also mirrors a long history of sericulture in Sichuan. According to "Ba Zhi" [Records of Ba] of *Huayang Guo Zhi* [Chronicles of Huayang], "Yu (the Great) requested the presence of lords of vassal states at Kuaiji. Tens of thousands of lords, including those from the states of Ba and Shu, went there with gifts of '*yu*' [jade articles] and '*bo*' [silk products]." It can thus be inferred that ancient people in Sichuan 4,000 years ago were already able to produce "*bo*," which was the earliest form of "*jin*" [brocade] (Huang, 2011, p. 1).

There are also silk relics as archaeological objects of art. For example, many scholars, including Huang Nengfu, a professor at the Academy of Arts and Design, Tsinghua University, believe that the world-famous standing bronze statue excavated from the Sanxingdui Ruins site was originally clothed in silk. Among the findings of further archaeological excavations at the sacrificial zone of Sanxingdui in 2021 were silk fabric residues in some ritual pits. Moreover, silk protein was found in multiple soil samples from the ritual pits. The discovery shows that more than 3,000 years ago, silk fabrics were already in use in the Sanxingdui kingdom.

The above evidence tallies with Huang's narrative of how Xiling introduced and popularized sericulture and silk production among the Shu people. In other words, Huang's narrative is based on solid historical facts of a particular period.

Burials

A burial is a form or act of burying a dead body. Ancient burial customs varied according to the times and places, including but not limited to in-ground burial, cremation, and water burial. Modern archaeological findings prove that as early as the Paleolithic period, the ancestors consciously buried the dead in the ground and that in the Neolithic period, it became the norm

to bury the dead in a collective burial pit (Xie, 2018, p. 162).

Upon the death of Cancong's father in the Min River valley, Cancong and his family held a grand funeral for the late chief in accordance with the tradition of the Shushan tribe. The burial ceremony was depicted by Huang Jianhua as follows:

> The Shushan tribe had its own (funeral) tradition, with burial objects and coffin pits unique to itself and distinctive from other tribes. After the chief was dead, Cancong had a sarcophagus made for him, and placed the sarcophagus containing the remains in a coffin chamber for a few days. When the auspicious day came, a grand funeral was held for the late chief. Then, the sarcophagus was carried to the graveyard, where it was put into an already prepared outer coffin made of stone slabs and buried in a sacrificial ritual. The origin of such a burial could be traced back to the era of Cancong's grandfather (Huang, 2021a, p. 18).

The abovementioned burial is the famous "sarcophagus" in ancient Sichuan. The so-called "sarcophagus" (also known as "stone coffin," "stone slab burial," or "stone slab tomb") is a type of archaeological and cultural relic characterized by a coffin chamber piled up with stone slabs or stone blocks (Shi, 2009, p. 177).

There are historical records on the sarcophagus in Sichuan, and the earliest mention can be found in "Shu Zhi" [Records of Shu] of *Huayang Guo Zhi* [Chronicles of Huayang]. It reads:

> After King You of (Western) Zhou violated the laws of the imperial court, the head of the Shu region took the opportunity to proclaim himself king. Thus, Cancong, Marquis of Shu, who had protruding eyes, became the first king of Shu. When he died, his body was put into a sarcophagus inside an outer stone coffin. This way of burying was followed by people in the state of Shu.

Thus, "sarcophagus" was known for being the graves of men with protruding eyes.

Sarcophagi as archaeological objects of art have also been found in Sichuan. The Yingpan Mountain site south of Fengyi town (Mao county, Aba Tibetan and Qiang autonomous prefecture, Sichuan) is by far the earliest and also the largest complex of sarcophagi ever discovered in China. There are tens of thousands of sarcophagi distributed in an area of 150,000 square meters (Chen, 2005). Most of the sarcophagi there were placed in vertical earth pits. These sarcophagi were all roofed but bottomless, and both the pits and sarcophagi were customized to the physical builds of the deceased, whose remains and grave goods were directly placed on the earth floor. These sarcophagi, pilled up with stone slabs of different sizes and thicknesses, were all without base slabs. Flagstones were used as side slabs, front slabs, and cover slabs. Small flat stones can be found at the bottom of side slabs for reinforcement purposes. In most cases, there is a thin bed of clay on the tomb bottom protecting the remains, and filled earth on the coffin top. Coffin chambers are generally 1–1.8 meters in length, and 0.2–0.4 meters in width, and there are even dual chambers. The Shushan tribe mentioned in the fiction originated in Diexi town (also known as Canling town) in Mao county. As Diexi is only about 50 kilometers away from the Yingpan Mountain, exchanges between the two places

should be easy and unencumbered, even in the era of Cancong.

Sarcophagus as a form of burial was mainly found in a half-moon-shaped belt of cultural dissemination stretching along the borderlands from northeastern China, through northern China, Gansu, and Qinghai, to western Sichuan and eastern Tibet. The upper reaches of the Min River in Sichuan remain the region with the most densely distributed and numerous sarcophagi in China, and sarcophagi discovered and excavated there account for more than half of the total number in southwestern China (Li, 2008, p. 75). Many archaeologists have done research on sarcophagi in this region, including Feng Hanji and Tong Enzheng. The sarcophagus, popular in the Western Sichuan Plateau, was the burial custom of the Diqiang people (Duan, 2010, p. 325).

Huang's narrative is in line with the then reality.

Pottery

Pottery is a major cultural feature of the Neolithic period, and is also the most prominent epitome of primitive artistic achievements in the history of arts and crafts (Wang, 1994, p. 16). In the prehistoric period, pottery, which was made by ancient people from raw clay through kiln firing, served for both practical and aesthetic purposes. This Neolithic invention is epoch-making in human history. Pottery came into being following the emergence of food cooking (Zhang, 2017, p. 9).

Huang Jianhua mentioned pottery making when detailing the founding of the Ba state in the *Menghui Gushu* [Ancient Shu Revisited in the Dream]. Wuxiang (also known as Lord Lin, who later became the founder of the Ba state) made unsinkable pottery ships by firing clay ships somewhere in present-day Jiajiang, Chongqing, in the early days of the Ba state. It is presumed that the Ba state was established by Lord Lin after the Cancong era and that it co-existed with the Yufu dynasty in ancient Sichuan. Huang Jianhua wrote:

> Exhausted, Wuxiang dozed off. In the dream, he went to a smoky place, where some old men were busy making and firing pottery. Sand clay was molded into a variety of vessels, which were then fired with dried firewood into pottery jars, pots, bowls, and cups for daily use. Wuxiang was looking at the fired pottery, fascinated and excited. Could this be a sign from gods (Huang, 2021a, p. 335)?

According to historical records, the Chinese people were among the earliest in the world to have mastered the pottery-making technique, and they were the first to put the pottery-making technique down in writing. There were mentions of pottery making in some ancient Chinese classics, such as "Shennong promoted the practices of agriculture and pottery making" in *Yi Zhou Shu* [Lost Book of Zhou], and "(Shun) made pottery by the Yellow River" in "Zashi Yi" [Miscellaneous Affairs 1] of *Xinxu* [New Order]. As early as the Yellow Emperor's era, there was a special post called *tao zheng* [chief potter] in charge of pottery making. Early in the Neolithic period, the ancestors of the Chinese had already learned how to mix water and soil

Figure 4. Painted earthenware bottle unearthed from the site of Daxi Neolithic culture in Wushan county, Chongqing[①]

into plastic clay, which was molded and fired into pottery in the kiln (Ruan, 2008, p. 428). The pottery-making technique was the most outstanding and diverse art creation of the Neolithic period, and is a precious heritage left by the ancestors of the Chinese nation in art history (Bo, 2003, p. 3).

Regarding archaeological objects of art, a pottery sherd with early Neolithic characteristics was unearthed at a stratum formed 7,500 years ago in Yifupu, Fengjie county, Chongqing (part of the Ba state in ancient times) in the 1990s. A lot of pottery was excavated from the site of Daxi Neolithic culture in Wushan county, Chongqing Municipality, and the pottery falls into four categories: red pottery, gray pottery, black pottery, and painted pottery. Of the pottery unearthed there, red earthenware, which was coated and fired at 800–870 °C, features a smooth and delicate surface with a reddish hue; some earthenware has a unique style of the red outer surface and black inner surface, due to "reversed" firing, which caused insufficient oxidation of the inner surface but complete oxidation of the outer surface (Shao, 2005, p. 44).

Huang's narrative of how Lord Bing, founder of the Ba state, made pottery ships was well-grounded and persuasive.

Conclusion

This paper examined the above five types of things of ancient Shu with the aid of related historical records and archaeological objects of art unearthed in Sichuan, and made a comparative study of these things with their respective textual descriptions by Huang Jianhua. It is thus concluded that the *Gushu Chuanqi* [Legend of Ancient Shu] trilogy by Huang Jianhua is not a free interpretation of history but historical fiction based on true stories. Or, to put it another way, the trilogy is historically grounded, although it is largely fictional. Huang Jianhua is an accomplished scholar and prolific writer with a number of academic publications (monographs in particular), which become an edge not possessed by most historical writers. His representative works include *Huayang Guo Zhi Gushi Xinjie* [A New Interpretation of Stories in the Chronicles of Huayang], *Si Lu Shang De Wenming Guguo* [Ancient Civilizations along the Silk Road], and *Literary Masters in Chengdu*.

"Cancong and Yufu of ancient dates were kings of the land with frontiers," said Li Bai in his poem *Shu Dao Nan* [Ode to Hard Roads to Sichuan]. Ancient Shu was a mysterious state

① Source: *Pictorial Encyclopedia: Ba−Shu Culture* by Tan Jihe and Duan Yu (1999, p. 108).

in what is now Sichuan province. Due to a lack of written records, ancient Shu often leaves an impression of being mysterious (Huang, 2021b, p. 493). It is not practical for young people today (except researchers and those who are truly interested in the history of ancient Shu) to read such ancient literature as *Shuwang Benji* [Biographies of the Kings of Shu] by Yang Xiong and *Huayang Guo Zhi* [Chronicles of Huayang] by Chang Qu, because of the high threshold of classical literature and insufficient reading time. Given that, Huang's *Gushu Chuanqi* [Legend of Ancient Shu] trilogy, which is easy to read and fascinating, offers readers an opportunity to approach ancient Shu.

A straw shows which way the wind blows. The *Gushu Chuanqi* [Legend of Ancient Shu] trilogy is historical fiction based on true stories.

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The Land of Shu: Where Tang Poetry Rose and Fell

Liu Huo*

Sichuan Literature and Art Critics Association

Abstract: During the Tang Dynasty, the land of Shu was composed of the Ba and Shu areas, which were adjacent to present-day Hanzhong city of Shaanxi province to the north, northern Yunnan province to the south, Wushan county of Chongqing to the east, and Xichang city of Sichuan province to the west. In the nearly 300 years of rule under the dynasty, a number of poets, whether they were born or just worked and lived there for a short period of time, wrote many immortal poems, which constitute an integral part of Tang poetry. They range from Chen Zi'ang and Wang Bo of the early Tang to Li Shangyin, Wen Tingyun, and Wei Zhuang of the late Tang. The land of Shu is, therefore, the witness of the rise and fall of Tang poetry.

The discovery and research of the Sanxingdui Ruins and the Jinsha Site demonstrate that the myths and legends passed down for generations locally are actually well-grounded on brilliant civilizations that existed in the Ba and Shu areas (Sichuan Basin and surrounding mountain ranges) hundreds of years ago. With further excavation and studies on the Sanxingdui Ruins and the Jinsha Site, the Ba and Shu civilizations have become one of the three key birthplaces of the Chinese civilization, with their importance the same as the other two—the Yellow River civilization and the Yangtze River civilization.

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* Liu Huo, Sichuan Literature and Art Critics Association.
  Correspondence concerning this article should be addressed to Liu Huo, Sichuan Literature and Art Critics Association, Sichuan. Email: liudaqiao@126.com

The land of Shu from the Qin to the Sui dynasties was described in detail in *Huayang Guo Zhi* [The Chronicles of Huayang] in its volumes, including "Ba zhi" [Records of Ba], "Hanzhong zhi" [Records of Hanzhong], "Shu zhi" [Records of Shu], and "Nanzhong zhi" [Records of Nanzhong] (Chang, 2010). Except for "Records of Nanzhong," the areas covered by the other three records are roughly the same as the areas under the jurisdiction of Sichuan province set up in the Yuan Dynasty. During the Shu Han period (221–263), the state established by Liu Bei and his son constituted one of the tripartite divisions of China with the other two states—Wei in the Central Plains and Wu in Jiangnan (regions south of the Yangtze River). The land of Shu in the Tang Dynasty covered nearly the whole area of southwestern China, including Jiannan Dao (Jiannan province, which consisted of Xichuan [western Sichuan] and Dongchuan [eastern Sichuan]), reaching present-day Wudu county of Gansu province to the north, and Gejiu city of Yunnan province to the south, Wushan county of Chongqing to the east, and Xichang city of Sichuan province to the west. In the late Tang Dynasty and the Five Dynasties and Ten Kingdoms period, two kingdoms were established there and later referred to as Former Shu (907–925) and Later Shu (934–966), respectively.

Gao Bing (1350–1423), a poetry anthologist and writer of the Ming Dynasty (1368–1644), created a literary review work titled *Tangshi Pinhui* [The Graded Compendium of Tang Poetry], the first book that had the largest collection of Tang poems among such books. In the preface to the book, Gao (1982) divided the history of Tang poetry into four periods: Early Tang (618–712, i.e., from the establishment of the dynasty to Emperor Xuanzong's reign), Golden Age of Tang (712–762, from the Kaiyuan year of Emperor Xuanzong's reign to the beginning of Emperor Daizong's reign), Middle Tang (762–859, from the beginning of Emperor Daizong's reign to Emperor Xuanzong's reign), and Late Tang (859–907, from Emperor Yizong's reign to the end of the Tang Dynasty). By this kind of division and a thorough check of *Quan Tang Shi* [Complete Tang Poems] compiled by scholars of the Qing Dynasty, it can be seen that the emergence and the end of Tang poetry were highly relevant to the land of Shu. Or, considering from the entries of Wang Bo and Chen Zi'ang into Shu to the entries of other poets, such as Li Shangyin, Wen Tingyun, Wei Zhuang, and Zheng Gu in the late Tang, we can conclude that Tang poetry both emerged and ended in the land of Shu.

Early Tang: Represented by Chen Zi'ang, Wang Bo, and Lv Qiujun

Chen Zi'ang (659–700), a native of Shu, was considered the poet who had initiated the innovation of poetry and created the Tang style, which was totally different from the poetry of the Six Dynasties prevalent at his time. His contribution was praised as, "He completely subdued the waves of decadence. All under heaven, without exception, underwent a change in content and pattern [in literature]." Another evidence for the initial relevance between Shu and Tang poetry may lie in the fact that Wang Bo (650?–676), the talented young poet recognized as one of the Four Paragons of the Early Tang, once visited the land of Shu.

Jiu Tang Shu [The Old Book of Tang] and *Xin Tang Shu* [The New Book of Tang] both include a biography of Wang Bo, but they do not mention his entry into Shu (Liu, 1975; Ouyang, 1975). *Tang Caizi Zhuan* [Biographies of Eminent Tang Poets], which was written by Xin Wenfang of the Yuan Dynasty (1271–1368) in the early 14th century, also does not contain relevant statements (Xin, 2019). Despite this, Wang's footprints in Shu were well recorded in some of his extant 89 poems. For instance, in *Jiangting Yeyue Songbie Ershou* [Parting by Moonlight in a River Pavilion], he wrote: "The stream from southern Ba runs into the Yangtze River. The mountain range blocks the cloud from the north of the Great Wall. On an autumn night with chilly moonlight over the quay; Who sees us weeping as we say farewell?" The "southern Ba" mentioned in the poem is present-day Banan district of Chongqing. During the Tang Dynasty, Banan was under the jurisdiction of the Yu prefecture of Jiannan Dao (literally meaning circuit, roughly equivalent to the present administrative level of a province). We cannot find any information in the official records about Wang Bo's life after he arrived in Shu, like whether he was dispatched there and assigned to an official position or who supported his living there. But we can see from the above poem that he did not mention any poor or difficult situation for living. It is described in *Biographies of Eminent Tang Poets* that "Wang Bo's writing was so brilliant that he was often commissioned by people to write articles or poems for them. Therefore, there were piles of gold, cloth, and silk in his home. He could get enough food and clothing just by writing." (Xin, 2019). If the description was true indeed, then no matter where he was, he could always depend on his ink brush to live comfortably. *Jiangting Yeyue Songbie Ershou* [Parting by Moonlight in a River Pavilion II] reads: "The drifting mist is shrouding the green stone steps; The moon is flying to the southern sky. My loneliness is hidden in the empty pavilion; It's so cold by the mountain and the river in the night." According to this poem, although Wang Bo felt lonely by himself in Shu, he was not living in a miserable situation. Despite "the drifting mist" and "cold … in the night," he still had his longings and expectations. In the *Shuzhong Jiuri* [The Ninth Day in Shu], he wrote: "On September 9th, at Wangxiangtai; I raised my cup to see off my guest in a place not my home. I'm tired of living lonely in the south; As I bitterly see swan geese flying from the north." Wang Bo died in his twenties. During his short life, he had to leave his home and take up government employment unwillingly. Wherever he travelled, he wrote many unrivalled poems, such as *Tengwang Ge Xu* [Preface to the Prince Teng's Pavilion], and *The Ninth Day in Shu*, which remain famous to the present day. Wang Bo also wrote about the land of Shu in prose. The Volumes 183 to 185 of *Quan Tang Wen* [Complete Prose Literature of the Tang Dynasty] include many tablet inscriptions written by Wang Bo about the land of Shu, such as *Epigraph on Jinghui Temple of Wudu Mountain in Mianzhu County of Yi Prefecture*, *Epigraph on Shanji Temple in Deyang County of Yi Prefecture*, *Epigraph on Huiyi Temple in Zi Prefecture*, *Epigraph on Baihe Temple in Feiwu County of Zi Prefecture*, *Epigraph on Huipu Temple in Tongquan County of Zi Prefecture*, *Epigraph on Fuhui Temple in Yuanwu County of Zi Prefecture*, and *Epigraph on Longhuai Temple in Jiulong County of Peng Prefecture*. Among them, *Epigraph on the Temple of Confucius in Yi Prefecture* is the representative work.

Although it is not on a par with the *Preface to the Prince Teng's Pavilion* in terms of popularity or influence, its aspirational and elegant style is similar to that of the latter. With a bold guess, we suppose that the *Epigraph on the Temple of Confucius in Yi Prefecture* may be the earliest eulogy to Confucius in the land of Shu.

Chen Zi'ang was acclaimed as the progenitor of Tang poetry by Fang Hui (1227–1305) of the Yuan Dynasty in his *Yingkui Lvsui* [The Quintessence of Regulated Verse from Ying Isle and Kui Constellation]. Chen's poems—*Deng Youzhoutai Ge* [A Song on My Ascending to the Youzhou Terrace], and a collection of 38 poems titled *Ganyu* [Moved by My Encountering], were praised by Fang as "lofty and concise; forceful and desolate." Chen is regarded as one of the outstanding Tang poets, and his poems are considered to represent the highest level at the inception of Tang poetry. Nearly 140 poems of Chen are extant nowadays. Although most of them were written after he left Shu, poems on his days in the area or his nostalgia for it are representative of his style. *Suizhou Nanjiang Biexiang Qu Guren* [Singing Goodbye to My Old Friend by the Riverside in Sui prefecture] depicts the scene in which his fellow held a farewell dinner for his leaving. The poem reads, "By the Chu River, I'm going somewhere far away again; The sailing boats are becoming farther and farther. My old friend comes to see me off; He has arranged a farewell dinner on the southern isle. What should I regret in my life? I regret that I couldn't retreat to a forest and mountain. Now I have to leave my hometown and mountain again. Let me sing a song to express my sorrow." Although it is also a poem on parting, it is quite distinct from poems with the same theme written in the Six Dynasties. Upon his leaving the land of Shu, he wrote, "The Wu Gorge is getting out of my sight; I still search for it as I walk down the Zhanghua Pavilion. As the boat passes through mountains and rivers of the ancient Ba state; I behold the Jingmen Mountain amid a mist. Towns can be seen beyond vast fields and land; Woods are blocked by piles of clouds. A traveller sings so wildly as I am. Who knows that he would come to the Chu area?" (*Du Jingmen Wang Chu* [Crossing Jingmen, Gazing Toward Chu]). Chen's feelings, emotions, and impassioned character are fully reflected in this poem. In *Ganyu XXXVI*, he wrote, "What do we admire and miss? Mount Emei in Shu it is. I want to travel with that mad man of Chu; Hoping to meet him over the clouds..." Lu Cangyong, a man of the same dynasty, spoke highly of his poems as, "He rose from the regions of the Yangtze and Hanshui Rivers (eastern Sichuan Province). Like a tiger, he gloated over the whole Xia (i.e., the Tang Empire). He stood out through a thousand antiquities. He completely subdued the waves of decadence. All under heaven, without exception, underwent a change in content and pattern" (*Tang Youshiyi Chen Zi'ang Wenji Xu* [Preface to the Works of Chen Zi'ang, Right Reminder of the Tang Dynasty]).

Lv Qiujun (?–709?), a native of Shu, is also worth mentioning here. In the Biography of Lv Qiujun attached to the Biography of Chen Zi'ang in the *Old Book of Tang*, it was recorded that "After Chen Zi'ang died, there was a man from Chengdu (Yi prefecture) who was also famous for writing poems and prose. In the Jinglong year of Emperor Zhongzong, he was recommended by Princess Anle, so that he rose to the official position of Taichang Boshi [Chamberlain for

Ceremonials]. When the princess was punished, he was demoted to be a granary keeper in the Xun prefecture. Later he died in his term of office. His works have ten volumes." This introduction shows that Lv was a person with a literary reputation during his time. It is a pity that only one of his poems was collected in the *Complete Tang Poems*. Titled *Linshui Ting* [Waterside Pavilion], the poem was inscribed on a stone tablet that still stands by Lake Erhai of Yunnan. It was written in Yunnan when he acted as a secretary and record keeper. The poem has such lines as, "The scenery is as beautiful as in Cangzhou; And as vivid as the youth. When we meet in our best days; Let us not mourn over our aging years." Although only one of his poems is extant, 10 of his prose compositions were kept in Volume 297 of *Complete Prose Literature of the Tang Dynasty*. Among others, those related to Shu include *Congratulation on Pardoning the Governor of Yi Prefecture*, *A Petition of the Folks of Yi Prefecture for Keeping Prince of Boling*, *A Petition of the Folks of Yi Prefecture for Keeping Sima [major] Deng Weizhen*, *A Petition of the Folks of Yi Prefecture for Keeping Sima [major] Shi*, and *A Statement on the Eighth Incoming Mica Powder for the Governor of Shu Prefecture*.

Golden Age of the Tang Dynasty: Represented by Li Bai, Du Fu, and Wang Wei

According to the evaluation system of China's history of poetry in modern times, the poems of Li Bai (701–762), Du Fu (712–770), and Bai Juyi represent the highest achievements of Tang poetry. Before the Ming Dynasty, however, Li Bai, Du Fu, and Wang Wei (701–761) were already considered exemplary representatives of Tang poetry. They were acclaimed respectively as "Immortal of Poetry," "Sage of Poetry," and "Buddha of Poetry."

Complete Tang Poems has 996 poems written by Li Bai. The imageries in these poems are so diversified that they range from blossoms to wine, from folk life to the imperial court, from ordinary people to immortals, from cockfight to sword-wielding, from the earth to the universe, from retreat to engagement, and from being ambitious to being depressed. Throughout his life, Li Bai travelled across the country and wrote what he saw and felt from the bottom of his heart. Some of his poems may not be as fabulous as his more famous ones. But those related to the land of Shu, though not many in quantity, are all very popular. For instance, the grand and magnificent *Shudao Nan* [Hard is the Road to Shu] reads, "Oho! Behold! How steep! How high! The road to Shu is harder than to climb the sky. Since the two pioneers put the kingdom in order, Have passed forty-eight thousand years, And few have tried to pass its border." The elegant and beautiful *Emeishan Yuege* [The Moon over Mount Brow] reads, "The crescent moon looks like old Autumn's golden brow; Its deep reflection flows with limpid water blue. I'll leave the town on Clear Stream for three canyons now. O Moon, how I miss you when you are out of view!" The carefree and unrestrained *Zao Fa Baidicheng* [Leaving the White Emperor Town at Dawn] reads, "Leaving at dawn the White Emperor crowned with cloud, I've sailed a thousand miles through canyons in a day. With monkeys' sad adieus, the riverbanks are loud; My skiff has

left ten thousand mountains far away." The heroic and optimistic *Wang Tianmenshan* [Mount Heaven's Gate Viewed from Afar] reads, "Breaking Mount Heaven's Gate, the great River rolls through; Green billows eastward flow and here turn to the north. From both sides of the River thrust out the cliffs blue; Leaving the sun behind, a lonely sail comes forth." All such poems show the importance of Shu to the poet. To put it in another way, they express his affection toward his hometown.

The An Lushan Rebellion (or An-Shi Rebellion [755—763]) was a milestone in the history of the Tang Dynasty, marking the change from the Golden Age of Tang to the Middle Tang. In the winter of the second year of Qianyuan (759), when the political situation was still unstable, Du Fu, a native of Henan, came into Shu by land from Tonggu (present-day Chengxian county of Gansu province). In the third year of Dali (768), he left this area by taking a boat from Kuizhou and going through the Three Gorges. Totally, he led an itinerant life in this area for nearly a decade. According to the studies of some scholars, during the ten years, Du Fu wrote about 470 poems in the land of Shu, including Chengdu, present-day Santai, Langzhong, Le Shan, Yibin, and some other places, and about 400 poems in the Ba area, including Chongqing, Zhongxian, Yunyang, and Fengjie, and some other counties. *Complete Tang Poems* has 1,451 poems written by Du Fu. This means that he wrote two-thirds of his poems in the Ba and Shu areas, and most of them are known worldwide. For instance, he wrote in Shu such famous works as *Shu Xiang* [Temple of the premier of Shu], *Ke Zhi* [For A Guest], and *Maowu Wei Qiufeng Suopo Ge* [My Cottage Unroofed by Autumn Gales]. He wrote in Fengjie of the Ba area such popular works as *Qiuxing Bashou* [Ode to Autumn (eight poems)], *Bazhen Tu* [The Stone Fortress], and *Deng Gao* [On the Height]. For Du Fu's poems written in Shu, the ballad style of *My Cottage Unroofed by Autumn Gales* expresses further and more deeply his empathy and compassion for the poor people of his period while *Ode to Autumn* stands for the highest and unparalleled achievements of regulated verses. No wonder Du Fu expressed proudly in *Qianmen Xicheng Lu Shijiu Caozhang* [Getting Rid of the Blues, Playfully Shown to Sergeant Major Lu] that, "In my late years, I gradually get more precise with poetry's rules," and in *Yonghuai Guji* [Singing My Feelings on Traces of the Past I] that, "In twilight years, his poems and *fu* stirred the River Pass." It can be said that his ten years of life in the Ba and Shu areas enabled him to make such accomplishments which played a vital role in Tang poetry.

As for Wang Wei, Tang Lin, an art historian, explained roughly Wang's travelling routes in Shu with his study of Wang's paintings about plank roads on Shu mountains. In fact, even without such paintings, we can still conclude that Wang had a close link to this area. This is because he wrote many poems with the theme of seeing off his friends who left for Shu, including *Song Yan Xiucai Huan Shu* [Seeing off Scholar Yan on His Return to Shu], *Song Cui Jiu Xingzong You Shu* [Seeing off Cui Xingzong on His Visit to Shu], and *Song Wang Zunshi Gui Shu Zhong Baisao* [Seeing off Venerable Master Wang on His Return to Shu to Sweep His Family Tombs]. In *Seeing off Scholar Yan on His Return to Shu*, the line, "The

road you take in parting will pass through Flower County; In returning home, you'll enter Brocade City." This shows the poet's familiarity with the city of Chengdu. His knowledge of culture, geography, and allusions to this area is also manifested in the use of "Brocade Washing" and "Cyan Rooster" in *Seeing off Venerable Master Wang on His Return to Shu to Sweep His Family Tombs*, which reads, "A Transcendent from the Grand Veil Heaven: Spring among the willows at Brocade Washing River. You have not been named emissary in search of the Cyan Rooster; But will only have the white crane report to the people of your town." Wang Wei was proficient in Sanskrit and excelled in music. His five-character regular verses, especially five-character quatrains, are considered superior in such verses of Tang poetry for their implication and fun. Speaking of Wang Wei, his good friend Yuan Xian, a native of Shu, must be mentioned. Born in Chengdu, Yuan could write and chant in Sanskrit. He wrote: "The lotus-flower Sanskrit letters came originally from Heaven; And you, a Director in State Affairs, awakened to meditation early on. When three dots form the letter 'i', then there are things to ponder; With one glance, all becomes illusion—one forgets the fish-trap." (*Chou Wang Wei* [Answering Wang Wei]).

The openness of Shu and the sociability of the Shu people reflected the inclusiveness and the boldness of the vision of the Tang Dynasty.

During the Golden Age period of the dynasty, or at the turn of the transition to the middle period, a few poets were also related to the land of Shu. For instance, Cen Shen (715–770) had a key role in frontier-style poetry and was a close friend of Du Fu. Like Du Fu, he also went to Shu. But unlike Du, who had to depend on others for a living, he came to take the post of the governor of Jia prefecture. He wrote many poems on the Shu culture when he lived there. For instance, "The first emperor of Shu and Marquis Wu; Met each other in the age of turbulence." (*Xianzhu Wuhou Miao* [The Temple of the First Emperor of Shu and Marquis Wu]); "Master Wen was not here anymore; The Shu people are left with an empty classroom." (*Wengong Jiangtang* [Master Wen's Classroom]); "I feel sad to visit Yang Xiong's former residence; As it looks lonely without the trace of any person." (*Yang Xiong Caoxuan Tai* [Yang Xiong's Caoxuan Terrace]); and "Xiangru's zither terrace is age-old; The owner has gone, and the terrace looks empty." (*Sima Xiangru Qintai* [Sima Xiangru's Zither Terrace]). According to Xin (2019), Cen Shen's frontier-style poems feature "courage under adversity" as reflected in *Baixue Ge Song Wu Panguan Guijing* [Song of White Snow in Farewell to Secretary Wu Going Back to the Capital], which reads, "Snapping the pallid grass, the northern wind whirls low; In the eighth moon the Tartar sky is filled with snow. As if the vernal breeze had come back overnight, adorning thousands of pear trees with blossoms white." For this feature, Du Fu praised the fact that "Cen Shen creates many new poems" in *Ji Cen Jiazhou* [Sent to Cen of Jiazhou].

Li Qi (690?–751?), a native of Shu (born in present-day Santai county), was a famous scholar in the Golden Age of Tang. His seven-character-regulated verses and frontier-style poems were as good as his peers. His frontier-style poems include, "There is no town for miles and miles

but tents in rows; Beyond the desert, there's nothing but rain and snow. The wild geese honk from night to night, that's all we hear; We see but Tartar soldiers shedding tear on tear." (*Gu Congjun Xing* [Army Life]; "She seems to be fluting, even now, a reed-song of home; Filling every soldier's eyes with homesick tears." (*Gu Yi* [An Old Air]). His seven-character regulated verses include: "By the window, green bamboo grows from empty land; Outside the door, the verdant mountain looks the same as before." (*Ti Lu Wu Jiuju* [Written on the Former Residence of Lu], and "Wielding a *ruyi* scepter as flowers fall from Heaven; Resting in an unoccupied house amidst dense spring grass." (*Ti Xuangongshan Chi* [Written on the Pond in Xuangong Mountain]). Li Qi had a wide circle of acquaintances. He made friends with many influential poets of that time, such as Wang Wei, Gao Shi, and Wang Changling, and echoed each other with poems. Li's style of regulated verses had a great influence on later generations. Shen Deqian, a scholar of the Qing Dynasty, compiled *Tangshi Biecai* [Anthology of Tang Poems], which has the comment that "Though Li Qi's seven-character regulated verses cannot rival those of Du Fu and Wang Wei, they were in compliance with the rules and forms of classical poetic composition." He also mentioned that Li's poems "were regarded by sons of Emperor Jiajing and Emperor Longqing of the Ming Dynasty as a yardstick." Who else in the world can have his works treated as a yardstick?

Around the period when the An Lushan Rebellion took place, Gao Shi and Yan Wu were assigned several times to Shu to act as commanders of border provinces. During the Tang Dynasty, poems acted as a special carrier. They were like a symbol, an official certificate, or a recommendation letter. The *Complete Tang Poems* has many poems of Tang emperors with a family name of Li, including 99 poems of Emperor Taizong and 60 poems of Emperor Xuanzong, as well as 47 poems of Wu Zetian, the empress regnant of the Wu Zhou dynasty, an interregnum of the Tang Dynasty. Gao and Yan governed areas where people lived on graziery. They were good friends of Du Fu and wrote brilliant poems as well. For instance, Gao Shi created *Renri Ji Du Er Shiyi* [Sending a Poem to Du Fu on the Human Day], which reads, "I sent a poem to the thatched cottage on the Human Day; As I felt pity for my old friend who must be missing his hometown. I can't bear to see willow twigs budding beautifully; The sight of branches of plum blossoms also makes me heartbroken. As I'm now in the remote southern area I cannot participate in any important political affairs; I'm full of concerns and worries. We miss each other and recall the past days on this Human Day; We have no idea where we would be on the same day next year. Be unsuccessful and retreating for three decades; How could I know that I end up becoming a frustrated official at such an old age. As a doddering governor, I feel ashamed that I could do nothing for you, my wandering friend." Yan Wu wrote *Baling Da Du Er jianyi* [A Rely to Du Fu from Baling to Express My Sentiment of Missing], which reads, "When I see the moonset on my bed in the Ba mountain; I miss you thousand *li* away from here. The poet joined the infantry for wine; The consultant of Imperial Kitchen was also good at writing poems. At the river head, maple leaves arouse nostalgia in the traveller; The yellow chrysanthemums outside the fence are

reminding me of whom? I often stand on my toes to look for you; Wailing gibbons and wild geese can't express my sorrow."

Tang poetry reached the acme of perfection in the Golden Age of Tang. During this period, Li Bai, Du Fu, Wang Wei, and other important poets came to Shu and wrote many well-known poems about this area, making this period the unrivaled highlight in Chinese history of literature and poetry.

Middle Tang: Represented by Bai Juyi, Yuan Zhen, and Xue Tao

After the Golden Age of Tang with Li Bai and Du Fu as the most outstanding poets in ancient Chinese poetry, Tang poetry went into a dormant state for a short while. Bai Juyi (772–846) even took this phase as "the collapse of the way of poetry" (*Yu Yuan Jiu Shu* [Letter to Yuan Zhen]). However, Tang poetry took on a completely new look after Yuan Zhen and Bai Juyi developed their popular and vivid poetic style, which was referred to as the "Yuan-Bai style" by Chen Yinke. The emergence of Yuan Zhen (779–831), Bai Juyi, and Liu Yuxi (772–842) glorified Tang poetry again. It is interesting that the three poets all had close ties with the Ba and Shu areas. Yuan Zhen came to Luzhou, Dongchuan of Jiannan in the capacity of a supervising censor to investigate a corruption case. Bai Juyi once served as the governor of Zhongzhou (Zhong prefecture, which is present-day Zhongxian county of Chongqing). Liu Yuxi once acted as the governor of Kuizhou (Kui prefecture, which is present-day Fengjie county of Chongqing).

In the spring of the 14th year of Yuanhe (819) (or the winter of 818, according to some records), Bai Juyi arrived in Zhongzhou by crossing the Wu Gorge along the Shu River. On his way to Shu, he wrote many poems, such as *Zi Jiangzhou Sima Shou Zhongzhou Cishi Yanghe Shengze Liaoshu Bicheng* [Transferred from Sima of Jiangzhou to Governor of Zhongzhou, Writing to Express My Gratitude and Loyalty to the Emperor], *Jiangzhou Fu Zhongzhou Zi Jiangling Yilai Zhouzhong Shi Shedi Wushi Yun* [Travelling from Jiangzhou to Zhongzhou and Boarding a Boat in Jiangling to Show My Younger Brother Fifty Lines of Verse], *Yeru Qutangxia* [Entering the Qutang Gorge in the Night], and *Ti Xiazhong Shishang* [Writing on a Stone in the Gorge]. All such poems showed his favor and longing for the land of Shu, at least a sentiment not as miserable and desolate as what he had felt after his demotion to *Sima* of Jiangzhou. Bai was the Tang poet with the largest number of poems (2,848) collected in *Complete Tang Poems*. During the nearly one and a half years (22 months according to some records) in Zhongzhou, he wrote approximately 120 poems, fewer than what he had created in Jiangzhou (288 poems). Although none of the poems he wrote in Zhongzhou were as great as his magnum opus, "*Pipa Xing*" [Song of the Pipa], many of them depict lychee vividly. For instance, *Ti Junzhong Lizhi Shi Shiba Yun, Jianji Wanzhou Yang Ba Shijun* [Writing 18 Lines of Verse on Lychee in the prefecture and Sent to Governor Yang of Wan prefecture], and *Chongji Lizhi Yu Yang Shijun, Shiwen Yang Shijun Yu Zhongzhi Guyou Luoju Zhixi* [Sending Again Lychee to Governor Yang as I Hear He Is Going to

Plant Such Trees, So I Teased Him in the Final Couplet]. These poems made the lychee growing along the rivers in Shu become widely known. His description of lychee as, "You are as lovely as red pearls; That is why the white-beard old governor is also so fond of you. Who will be here when you bear fruit ten years later; Despite the fact, I still grow you in the courtyard." (*Zhong Lizhi* [Planting Lychee]) is taken as a classical image of the fruit.

As for Yuan Zhen, he passed the imperial examination in the same year as Bai Juyi. After he entered Shu, he had some romantic experiences. In the spring of the fourth year of Yuanhe (809), he was assigned to Dongchuan of Jiannan as the newly appointed supervising censor. Soon after he arrived in the area, he wrote 19 poems as a series titled *Shi Dongchuan* [To Go to Dongchuan]. One of them reads, "I eat cold food for many years as the weather is so fine; It is also convenient and easy to get for trips. I arrive at the Han River on the Qingming Day; A country magistrate rode a horse to welcome me." This shows how high his spirit was after he had been offered an official position for the first time. It is quite possible that the widely eulogized lines, "Having crossed the vast oceans, I can no longer take a river seriously. If it's not on Mount Wushan, it's not a cloud. I don't care to look back on my leisurely walks among the flowers and shrubs, half due to religious devotion, and half due to you." (*Li Si* [On Parting IV]) was written after he was in Shu. Certainly, his romance here was vividly reflected in his poem *Jizeng Xue Tao* [To Xue Tao], which reads, "By the beautiful Brocade River and Emei Mountain; Appear two talented ladies as Wenjun and Xue Tao. Their speech is as eloquent as the glib parrot's tongue; their proses are as splendid as the phoenix's feathers. Men of letters stop writing in succession; officials want to get promoted to their city. I become lovesick after our parting; As much as the calamus growing." It was not clearly recorded in historical documents whether he had met Xue Tao in person, but the above poem demonstrates his appreciation and admiration of the talented Xue Tao. In another aspect, it shows how talented Xue was.

After Yuan Zhen and Bai Juyi entered Shu, their poetic talent was nourished by the picturesque area.

Xue Tao (768?–832) was specially introduced by Zheng Zhenduo (1898–1958), a famous scholar in the modern and contemporary history of Chinese literature, in Section 8 of Chapter 27 of his monograph titled *Chatu Ben Zhongguo Wenxue Shi* [Illustrated History of Chinese Literature] published in 1932. This shows a historian's recognition of Xue as an important poetess. *Complete Tang Poems* covers about 200 poetesses, collecting 86 of Xue's poems. Therefore, among the poetesses, Xue is only surpassed by Madame Huarui (in detail below) in terms of the number of poems included. In Songzhou, Xue wrote *Shi Li Shi* [Ten Poems of Leaving] with artisanal paper. In the series, one poem titled *Bi Li Shou* [Chinese Brush Leaves Hand] reads, "Made of the finest of hairs, you called me favorite; And on your pink stationery, I dropped precious flowers." It shows that "pink stationery" was a kind of paper specially made by Xue and her favorite means to express love. From then on, "pink stationery" became a poetic symbol of the land of Shu. Her relationship with Yuan Zhen was reflected in *Ji Jiushi Yu Yuan Weizi* [Sending

Old Poems to Yuan Zhen] as "Like hidden emerald, I'm ever kept apart; On my self-made rosy leaf, I pour out my heart." Her relationship with Wei Gao was expressed as, "In and out the vermillion gate, I've been allowed to stay. The owner seems to love my joyful singing. But filling my mouth with filthy mud to build my coral pillow; In these rafters, I can't stand to build one again." (*Yan Li Chao* [Swallow Leaves Nest]. Both poems are proof of the relationship between this talented lady and the officials. Xue Tao, together with Wenjun, Madame Huarui, and Huang E, were recognized as four talented ladies in Shu. This marks an advancement in the history of Chinese poetry.

The Middle Tang, a period longer than the Early Tang, Golden Age of Tang, and Late Tang, witnessed not only the poetic talent of Bai Juyi, Yuan Zhen, and Xue Tao, but also the brilliance of many other poets. Liu Yuxi wrote several poems under the title of *Zhuzhi Ci* [Bamboo Branch Songs], which was adapted by Liu from a folk song and later became the name of a tune to which *ci* or *qu* was composed. His most famous lines are, "Between the green willows the river flows along; My dear one in a boat is heard to sing a song. The west is veiled in the rain, the east enjoys sunshine; My dear one is as deep in love as day is fine." Zhong Ziling (744–802), a native of Emei (or Chengdu from other records), lived in the period under the reign of Emperor Dezong (approximately in the late eighth century). He was acclaimed as, "forming a school of his own thoughts" and, "standing out among scholars in Shu" (in *Shangshu Simen Yuanwailang Zhongjun Muzhiming* [Epigraph on Vice Director Zhong] written by Quan Deyu). Zhong was a Confucianist and a poet. Although *Complete Tang Poems* only includes one of his poems, *Complete Prose Literature of the Tang Dynasty* has nine prose items written by him, and eight of them are rhymed *fu* (intermediary pieces between poetry and prose). After Chengdu was occupied and slaughtered by the Nanzhao Kingdom in the third year of Dahe (829), Yong Tao (?-834?), a native of Chengdu, wrote the poem series titled *Ai Shuren wei Nanman fulu wuzhang* [Five Poems on Mourning the Captivity of Shu People by the Nanman Tribe], which reads, "The city was returned to the Han general; But beautiful women were seized by barbarian tribesmen. In the south of the Brocade River cries were heard diminishing; They were from Shu captives weeping for forced leaving." (*Chuchu Chengdu Wen Kusheng* [Hearing Captives Crying for Leaving Chengdu]) and "There's no land of Han to the south of Xizhou; They felt sad that they would become barbarian people since then. Great sorrow suddenly rose with a gust of gale; The clouds were gloomy and the sun was setting." (*Bie Xizhou Yishi Tongku Yunri Weizhi Bianse* [Upon Leaving Xizhou Great Sorrow Echoed by Clouds and Sun Turning Gloomy]. He recorded the terrible disaster happening in the land of Shu at that time with his verses.

It can be said that poems are not only literary works. They are also of historical significance. Poets, whether they came to Shu from other places or were born there, all witnessed the Tang Empire going from prosperity to decline, and recorded this period by means of poems for later generations.

Late Tang: Represented by Li Shangyin, Wen Tingyun, and Wei Zhuang

Zheng Zhenduo held that the style created by Li Shangyin and Wen Tingyun opened a new chapter for the genre *ci* in the Five Dynasties and the Northern Song and Southern Song dynasties. (*Chatu Ben Zhongguo Wenxue Shi* [Illustrated History of Chinese Literature II]). The opinion is well-grounded.

Anyone who knows even a little about Tang poems cannot be ignorant of *The Sad Zither* written by Li Shangyin (813?–858?), "Why should the sad zither have fifty strings? Each string, each strain evokes but vanished springs. Dim morning dream to be a butterfly; Amorous heart poured out in cuckoo's cry. In moonlit pearls see tears in mermaid's eyes; From sunburnt jade in Blue Field let smoke rise. Such feeling cannot be recalled again: It seemed lost even when it was felt then." Li's poems became very popular in the late Tang Dynasty and the Song Dynasty. Then they have been valued more since the Ming and Qing dynasties. The *Tangshi Sanbai Shou* [Three Hundred Tang Poems], the most influential anthology of poems in China, includes 24 of Li's poems. Therefore, Li ranks fourth in terms of the number of poems collected by the anthology, just following Du Fu (38), Wang Wei (29), and Li Bai (27). As mentioned above, the four poets were closely related to the land of Shu. His riddle poems, represented by the above poem starting with *Jinse* [The Sad Zither] in the first line, contain many allusions and derivatives, featuring magnificent descriptions, tender and romantic sentiments, and mournful and heart-touching feelings so that his poems are considered phenomenal in the history of Chinese poetry. He had his best days during the four years when he served in the governor's office of Zi prefecture (present-day Santai county). He wrote many poems in the land of Shu, which he had longed to visit. Li's prose compositions were recorded in 11 volumes (Vol. 771 to Vol. 782) of *Complete Prose Literature of the Tang Dynasty*. When he lived in the land of Shu, he wrote *Zizhou Daoxing Guan Beiming* (*Bingxu*) (Inscription on Daoxing Temple of Zi prefecture [Preface Included]), *Jianzhou Chongyang Ting Ming (Bingxu)* (Inscription on Chongyang Pavilion of Jian prefecture [Preface Included]), *Tang Zizhou Huiyi Jingshe Nanchan Yuan Sizheng Tang Beiming (Bingxu)* (Inscription on Sizheng Room, Southern Buddhist Hall of Huiyi Vihara in Zi prefecture of Tang [Preface Included]). These texts preserve the precious cultural legacy of the area. "You have arrived in Linqiong at the old wine stand; Asking if Sima Xiangru is still around. Cold was the zither with the golden emblem; In love with the new guy, Wenjun no longer missed her ex." (*Ji Shu Ke* [To a Guest from Shu]). Through such poems or prose, Li showed that he was proud of being like a local there.

Huajian Ji [Among the Flowers] contains 66 ci-poems of Wen Tingyun (812?–882?). These ci-poems describe nothing related to Shu, but from Vol. 577 to Vol. 583 of *Complete Tang Poems*, there are several of Wen's poems relevant to the land of Shu. Just some words in the titles already show the relevance, including Jincheng [Brocade city], Lizhou [Li prefecture], and Xinjin.

Jincheng Qu [Song of Brocade city] can even be taken as a simplified collection of the culture, geography, and customs of the area. The poem reads, "Snow glitters on mountain ranges in Shu; They are as many as bamboo shoots winding through. The wind stirs the brocade washed in the river; With colors of rosy clouds, the patterns are like blooming azalea. Cuckoos fly to somewhere under the rocks; They whine about their nostalgia at moon nights. The Ba River flows endlessly in a melancholy mood; The weaving girls are making brocade with blood and tears. When they die, their miserable souls still cannot return home; Then they learn to plant Ormosia trees at the river head. Even they can send seeds home when the trees grow up; They cannot cross the five thousand *li* of wilderness to head for home." Even seven-character lines can have a regulated style under Wen's brush, not to mention his five-character verses written in Shu. They include *Wushan Shennümiao* [Shennü Temple of Wushan Mountain], which reads, "The old tree is not luxuriant anymore; The small boat is loaded with grief and bitterness. A grove of mottled bamboo grows in the night; What does the jade pendant clatter for?" and *Lvbo Xinjin Queji Yier Zhiji* [To My Bosom Friend During My Stay in Xinjin during My Trip], which reads, "I sense the grief and bitterness of separation; I seem to hear songs loud and noisy. The woods are high and the moon just rises; The river afar seems misty and dusky." Wen and Li are both recognized as representative poets of Late Tang, but Wen's contribution to Chinese poetry is more attributable to his *Among the Flowers*. The first piece of *ci* in Vol. 1 of the collection is *Pusaman* [Buddha-like Barbarian], which reads, "The hill-by-hill scene on screen shows dim or bright glow; Her curled hair flits over her cheeks like clouds above snow."

Hence, speaking of *ci*, no one does not know his name. As famous as Li Shangyin for poems, the two are collectively called "Wen Li", while for *ci*, he is often linked with Wei Zhuang and collectively called "Wen Wei."

According to Xia Chengtao (1900–1986), a famous scholar in the *ci*-poetic study, Wei Zhuang (836?–910) was from "an aristocratic family in the Tang Dynasty." Before he came to Shu, he had already risen to fame through his poems. After experiencing the Gengzi Rebellion (also called the Guangming Rebellion) in the first year of Guangming during Emperor Xizong's reign, he wrote *Qinfu Yin* [The Lament of the Lady of Qin], which was regarded by Chen Yin Ke (1890–1969), a famous historian, as "the greatest work of Wei" in *Wei Zhuang Qinfu Yin Jiaojian* [Verification and Commentary on Wei Zhuang's *Qinfu Yin*]. Because of the brilliant couplet, "The Inner Treasury was burned to ashes of brocade and embroidery; On the Street of Heaven everywhere one stepped were the bones of officials." Wei was then called a scholar known for "the Lament of the Lady of Qin." Wei's influence on later generations does not come from his poems but his *ci* written after he lived in Shu. *Complete Tang Poems* contains over 300 of his poems, including 54 pieces of *ci*-poems, which makes him the poet with the largest number of *ci* poetry included in the collection. We have no evidence now if there is any relevance between Wen's *ci*-poems and the land of Shu, but we are certain that many *ci*-poems of Wei are related to it because of the following: four lyrics to the tune *Qing Ping Yue* [Pure Serene Music], three lyrics to the tune *He*

Chuan [River Messages], five lyrics to the tune *Tian Xian Zi* [Heaven's Immortal], and two lyrics to the tune *Si Di Xiang* [Thoughts of Paradise]. The second lyric to the tune *Thoughts of Paradise* depicts the scenes and imageries that were typical to the Chengdu Plain, such as, "On a spring day's stroll; Almond blossoms drift all over my head. Who's that young man on the pathway? How suave he is! I would like to be married to him; My whole life long. Should I be thoughtlessly abandoned, I would feel no shame." In 910, the fourth year of Wucheng of Former Shu, Wei Zhuang died at the age of 75 in Hualinfang [Flowery House] (in the present-day Wuhou district of Chengdu). Whether from a geographical or cultural point of view, his death marked the end of Tang poetry and the beginning of a new age. Six decades after his death, ancient China entered a dynasty, the Song Dynasty, which emphasized civil administration over national defense, and an era that witnessed the heyday of *ci* poetry, for which Wen and Wei were pioneers.

In the Late Tang, Chang'an and Luoyang, the two capitals, as well as other places in the Central Plains, were looted and damaged in the war. Towns and villages, and culture and education, struggled to survive in a deserted and bleak situation. The land of Shu at that time was comparatively peaceful and steady due to separation or being a long distance from the Central Plains. For instance, during the An Lushan Rebellion, Emperor Xuanzong fled to Shu for a relative sanctuary, and during the Guangming Rebellion, Emperor Xizong escaped to Shu as well. The poetry circles in Shu were very active back then.

Madame Huarui (883?–926?) was a concubine of Later Shu's emperor Meng Chang. *Complete Tang Poems* has 99 of her poems. Though collectively called "*Gong Ci*" [Lyrics on Court Life], not all her poems were about grievance and loneliness in the imperial harem. Her verses are as refreshing and natural as in, "The nine turnings of the Dragon Pool are connected underneath; the willow twigs rise with the gentle breeze. The scenery is as beautiful as that of Jiangnan; Gaily painted pleasure boats are moving across green water. With the touch of the spring breeze, everything looks vivid and vibrant; I stealthily pick an acacia twig and walk by the river. Unfortunately, my behavior is spotted by an attendant at a distance; I then pretend to use the twig to throw at an oriole." Her other lyrics express such feelings and reality as genuine as in, "I entered the interior garden on the Start of Spring Day; The ruby flowers were as tender and impressive as light rosy clouds. I knelt down on a dewy marble step; I heard the imperial edict say I was selected to be a concubine in the palace. I was accompanied by many attendants; my brush and ink-stone were carried along the pond road. I can write characters on colored paper; So I create some new poems by the imperial form." This shows her talent and interest. Her lines make readers wonder if her creation was the inspiration for *Li Qingzhao's Xiari Jueju* [Summer Quatrains]. For example, "The king on the rampart flies the white flag; Deep within the palace how could I know? One hundred forty thousand all disarmed! Among these were there not a single man?" (*Shu Wangguoshi* [Narrating the Death of the Shu State])

Jia Dao (779–843) was regarded as the originator of the industrious versification style of poetry. He died in Puzhou (present-day Anyue), a key town famous for Buddhist stone carvings

when he served as Administrator of Granaries there. *Complete Tang Poems* contains 390 of his poems. Most of them were written when he was at his post in Shu. For instance, *Song Yong Tao Rushu* [Seeing Yong Tao off to Shu], *Song Li Fu Shilang Jiannan Xingying* [Seeing off Assistant Minister Li Fu to Field Headquarters in Jiannan], and *Song Zhu Xiu Gui Jiannan* [Seeing off Zhu Xiu for His Return to Jiannan]. His poem *Ti Changjiang* [On Changjiang] reads, "In Changjiang after many rainy days; The moon shines amid myriads of stars." The "Changjiang" in this poem does not refer to the Yangtze River. It was actually the name of the jurisdiction covering present-day Daying and Pengxi counties of Suining city in Sichuan. After his demotion, Jia first served as an official registrar in Changjiang, where he perhaps enjoyed three years of the freest state in his life. Therefore, he was also called "Jia Changjiang," and his anthology titled *Changjiang Ji* [The Collection of Changjiang] as well.

Li Yuan, whose years of birth and death are unknown, was a native of Shu and a successful candidate in the highest imperial examination in the third year of Taihe (830). He served as the military and political chief of Zhongzhou, Jianzhou (present-day Jian'ou city of Fujian province), and Jiangzhou (present-day Jiujiang city of Jiangxi province) in the capacity of the prefectural governor. Later he went to the capital to be the prime minister. Therefore, his poems are highly related to the system, officials, affairs, and history of the Tang Dynasty. His couplet, "In the green mountains not sated after countless cups of wine; The entire day whiled away over one game of go." (in Vol. 519 of *Complete Tang Poems*), almost made the Tang emperor of his time doubt his governing ability. His nostalgia is fully reflected in his poem titled *Song Ren Ru Shu* [Seeing Someone off to Shu], which reads, "Men from Shu miss their homes much; Today you are leaving for such a nice place. Beyond clouds, trees are growing verdantly; Red structures are post houses along the way. The cuckoo chirps as the ancient king; The Ba River meanders through like a Chinese character. Not knowing if on a rainy night; Where can I dream of my Daozhou?" Here Daozhou is actually another name of Yizhou (Chengdu). Therefore, this poem reflects most of his nostalgia.

Zheng Gu (851?–910), who had entered Shu several times, was praised by Ouyang Xiu, a leading and pioneering figure in the literary world of the Song Dynasty as, "When I was a child, I often recited Zheng's poems." This shows the status that Zheng's poems enjoyed at the beginning of the Song Dynasty. *Complete Tang Poems* includes 325 of his poems, over 40 of which were written in Shu. For instance, "The drizzle of rain touches everywhere wet; The sun sets over the sparsely populated area in the west. Spring fills me with nostalgia for Shu; As I no longer hear cuckoos' cry." (*Jialing*), or "The steep mountain has white clouds on top; The snow remains on the peak even in spring…I cannot help moving toward the temple; A picturesque scene just jumps into my sight." (*Emeishan* [Emei Mountain]), or "A thousand patches of field for growing tea in Mengding; A clear brook for making paper in Huanhua. Only trees still exist in the house of Yang Xiong; Even old neighbors were gone around Du Fu's cottage…" (*Shu Zhong San Shou* [Three Poems on Shu II]. We can thus assume that the land of Shu played an important role in the

development of poetry in the Late Tang and witnessed its last glory. Or we can say that just for the Late Tang only, the land of Shu had preserved all the elegance of Tang poetry.

The Ba and Shu areas, or the Sichuan Basin, were once home or temporary dwelling places to a number of brilliant Tang poets that are remembered today. Fang Hui of the Yuan Dynasty regarded "Chen Zi'ang as the progenitor of Tang poetry in the Early Tang," and Zhang Duanyi of the Song Dynasty referred to Zheng Gu as "the leading poet in the Late Tang." Chen and Zheng stood respectively for the inception and culmination of the glory of Tang poetry. In a nutshell, the land of Shu and Tang poetry benefited each other and prospered together.

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Analysis and Commentary on Mao Zedong's Views on Women's Liberation in His Early Manuscripts

Li Ling*

Sichuan Academy of Social Sciences

Abstract: The *Mao Zedong Zao Qi Wen Gao* [Early Manuscripts of Mao Zedong] is a collection of young Mao Zedong's manuscripts from 1912 to 1920 and is a record of his growth during his youth. It is worth mentioning that the views of women's liberation and progress have a place in Mao Zedong's early manuscripts. This study focuses on reviewing and discussing the motivation behind young Mao Zedong's attention to women's liberation and progress issues, his relevant views in these manuscripts, and how these views played a role in his growth into a Marxist. This study aims to explore, from the perspective of women's studies, the thought basis and virtues that led young Mao Zedong to become a Marxist.

Keywords: early manuscripts of Mao Zedong, views on women's liberation, commentary

The study on young Mao Zedong's views on women's liberation and progress is inspired by Ji Mu Wen [Funeral Oration for My Mother] in *Mao Zedong Zao Qi Wen Gao* [Early Manuscripts of Mao Zedong]. In the oration, he recalled the days of his mother's life, lamented the difficulties she endured, praised her love, her guidance for her children and her friendliness to

the neighbors with words that are sincere, affectionate, and touching. This is the last letter that a son wrote to his mother. It not only tells the greatness of his mother, but also expresses the son's sympathy for a woman who lived in the "end of the traditional three cardinal guides."[①] Mao Zedong elevated his personal emotions to the awareness of the social injustices faced by women living in the "end of the traditional three cardinal guides," and this is the charm of Ji Mu Wen in the sense of sociological imagination. It is worth mentioning that the *Early Manuscripts of Mao Zedong (The Manuscripts)* is a collection of manuscripts of young Mao Zedong from 1912 to 1920. It includes articles, letters, poems, reading notes, plans, diaries, chronicles, and conversations, which reflect young Mao Zedong's profound understanding of women's issues. However, in the existing literature, the studies on young Mao Zedong's participation in social affairs are more than the studies on his views on women's liberation and progress. Using women's liberation as a medium, this study attempts to examine the social and personal factors of young Mao Zedong in accepting Marxist thought.

The Motivation Behind Young Mao Zedong's Attention to Women's Issues

Women's liberation is an important part of the contemporary ethos. During this period, as an important aspect of social change, the issue of women's liberation has received extensive attention and has made important progress. In the history of China, the national movement of women's liberation started during the May 4th Movement. During the early stage of the New Culture Movement, Chinese socialist pioneers strived to enlighten the public about the new ideas of democracy and science. They put forward general propositions on women's liberation and discussed the great significance of women's liberation to social progress, and as an important aspect of social changes, women's liberation has also made significant progress. Young Mao Zedong's views on women's liberation were gradually formed under such a broad historical background. This study attempts to discover the foundation of Mao Zedong's views on women's liberation from the subtleties of his writings and to enrich the literature that traces the realistic background of how Mao Zedong became a Marxist.

There are three direct sources that record Mao Zedong's concern for women's issues.

The first is his mother's influence on the family. Mao Zedong disclosed the tragic destiny of his mother at the beginning of the Ji Mu Wen. She gave birth to seven children in her lifetime; three grew up while four others, including two girls and two boys, died young. She worked hard on child raising, and suffered from various illnesses. As her son, Mao Zedong said that he was filled with sadness whenever the memories flooded back. However, from the perspective of women's liberation, he then evaluated the whole life of his mother from two perspectives. The first was her virtue. The most admirable character of his mother was her universal love. She reached out to every person

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① In traditional Chinese society, one of the basic principles of the Confucianist ethics morals is "the three cardinal guides," which means rulers guiding their subject, fathers guiding sons, and husbands guiding wives. Women were called "the end of the three cardinal guides" for that "husbands guiding wives" is the last of the three cardinal guides.

with love, disregarding the close or distant relationships. She was kind by nature, and the neighbors were always moved by her. She was sincere and had no intention to deceive others. She was clear-headed and organized, and could tell the difference between right and wrong. She liked to keep the environment neat, clean, and spotless. She had a pure heart and treasured friendship. In the son's eyes, the mother had all the five constant virtues (benevolence, righteousness, propriety, wisdom, and trustworthiness) and was a charismatic person, but the role and identity of Mao's mother also gave him dull pain. His perspective was that his mother suffered unfair treatment throughout her life. If her universal love came from the five constant virtues, the unfair treatment came from "living in the end of the three cardinal guides." A wife had to obey her husband, and as a result, she could not fulfil her aspirations and could not get what she desired so she was mentally distressed. To Mao, it was his mother's eternal regret. Mao Zedong was born in an ordinary and typical peasant family in Shaoshan, Hunan province. His father, Mao Yichang, with the courtesy name of Shunsheng, was born on October 15, 1870, and died on January 23, 1920; his mother, Wen Suqin,[①] was born on February 12, 1867, and died on October 5, 1919. Mao Zedong's father, Mao Yichang, was a farmer who was both ordinary and extraordinary. He was also a strong-willed, shrewd, and capable father. Mao Zedong's mother, Wen Suqin, was a great woman, a typically dutiful wife and a loving mother. She was hardworking and frugal, kind-hearted, warm, and generous, and she always helped the other villagers. In a letter to his classmate Zou Yunzhen, Mao Zedong wrote, "There are three kinds of people in the world. One is to harm others to benefit themselves, another is to benefit themselves without harming others, and another is those who can harm themselves to benefit others. My mother was the third kind of person." "My mother was a kind woman who was generous and forgiving, and was willing to help others at any time. She sympathized with the poor, and when they came to beg for rice in famine years, she would not hesitate to hand out rice." Mao Zedong was deeply influenced by his mother and was willing to help others since he was a child. Mao Jusheng, the younger cousin of Mao Shunsheng, came from a poor family. Mao Zedong and his mother sympathized with him and often gave material assistance to this poor relative. Mao Jusheng relied on a paddy field that covered seven *mu* (about 0.466 hectares) to make ends meet. Mao Shunsheng had long been interested in this paddy field and took the opportunity to buy it when Mao Jusheng was having the most difficult time. Mao Zedong and his mother were strongly opposed to what the father had done after they knew it, but Mao Shunsheng denied that he had done anything wrong. Mao Zedong wittily said that there were two "parties" in his home, which were the "ruling party" consisted by his father and the "opposition party" consisted by him, his mother, his younger brother and sometimes the hired workers. However, in the "united front" of the opposition party, the opinions of the members were not always the same. Mao's mother advocated a policy of indirect attack. She opposed any explicit expressions of emotions, and any attempts that openly resisted the "ruling party." She said

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① According to the Resume filled out by Mao Zemin on behalf of Mao Zedong, which is kept in the Russian State Archive of Socio-Political History, her real name is Wen Suqin, instead of the previously known "Wen Qimei," ("文其美" or "文七妹") with two versions in Chinese of the same pronunciation

that this was "against the rules of China." The taboo of "outside the rules of China" was exactly what Mao Zedong had been trying to break. Through his mother, he saw the suffering of women, the first was childbirth, and the second was having low status. In his adolescence, Mao Zedong lived in Shaoshan and had a rebellious spirit, even under his father's strict discipline. Some scholars believe that he opposed the patriarchal society represented by his father. In fact, it was the family environment in which he grew up, the morality of his mother, the peremptoriness of his father, and the sense of social responsibility that he learned from his studies that prompted Mao Zedong to shift from a father-son conflict to a social consciousness that opposed authority. Ross Terrill (2019, p. 15) said that this illustrated the rigid and strict hierarchy in the bigger picture of traditional Chinese society.

The second is the circumstances that he faced. According to the *Shao Shan Mao Shi Zu Pu* [Pedigree of the Mao's Family of Shaoshan], Mao's wife Luo was born on October 20, 1889, and was four years older than Mao Zedong. Mao Zedong's father had extremely high expectations of him, as he was the eldest son. That was why his parents arranged Mao Zedong's marriage and made the 14-year-old Mao Zedong marry Luo. Luo's grandmother was also a member of the Mao family, and was the cousin of Mao Zedong's grandfather, Mao Yichen. That is, Luo's grandmother was Mao Zedong's great-aunt, while Luo was the niece of Mao Zedong's father. Mao Shunsheng was so fond of the niece that he asked Luo's family to marry the daughter into his family. In the old days, the Chinese people considered that marriages between close relatives were worth celebrating. In 1936, Mao Zedong told Edgar Snow: "My parents had married me when I was sixteen to a girl of twenty, but I had never lived with her—and never subsequently did." Mao Zedong had never considered Luo as his wife and hardly thought of her at the time. Mao Zedong had always been bothered by the feudal thought that marriage should be between families of equal social ranks. He advocated free love and agreed to break the concept of family ranks. His classmate and friend Cai Hesen, and Cai's wife Xiang Jingyu was a good example. In 1920, Xiang, a Hunan woman who was studying in France, married Cai without a traditional wedding ceremony or legal registration. Rather, they announced they would build a new form of "Xiang-Cai alliance" due to their shared aspiration for revolution. The youths at the time passed on the story with admiration. In the winter of 1920, the marriage of Yang Kaihui and Mao Zedong was a result of free choice and free love of educated youths under the influence of the new thoughts in the May 4th Movement. Yang Kaihui was born in a scholarly family in Changsha and had been a companion of Mao Zedong in his early revolutionary activities. When they were getting married, she refused to sit on a bridal sedan chair, prepare a dowry, or listen to the words of a matchmaker to demonstrate the difference between her marriage and a conventional one. Yang Kaihui was also a dutiful wife and loving mother and played an important role in the early emotional life of Mao Zedong. Mao Zedong's poem, *Tune: The Beautiful Lady Yu—Written on My Pillow* expressed his nostalgia and longing for his beloved wife. "Like what would sorrow look, piled on my pillows? A sea of surging billows. As night is long and dawn is slow to come from afar, Lonely I rise in

nightgown to count star on star. When morning comes, all thoughts fade from my mind. How can I leave you far behind? A hooklike waning moon floats in the western spheres. At the sight of this, can I refrain from shedding tears" (Mao, 1995, p. 60)? This was the first time Mao Zedong had written a poem for his beloved wife, and it was also his first love poem in the ancient graceful form. His poem was poignantly and beautifully written, while his endless nostalgia and longing for his beloved wife were conveyed between the lines. What is even more legendary is that an unsent letter of Yang Kaihui was made public to the world 80 years later, which would make any reader sad and sigh. The lines in her reply reveal how sincere their love was and how dearly they longed for each other. The romantic life of a revolutionary was the realistic basis for Mao Zedong's thoughts on women's liberation.

The third is the influence of the new thoughts he was exposed to in his studies. Mao Zedong was originally a student at The Fourth Normal School of Hunan Province, which was merged into the Hunan Provincial No. 1 Normal School in April 1914 when Mao was still studying there. In the autumn of the same year, Mao joined the 8th class of the bachelor's course of the Hunan Provincial No. 1 Normal School and graduated in June 1918. In his five years of studying in the normal school, he transformed from a student who pursued knowledge to a politician who followed the revolution. During the rise of the New Culture Movement, women's issues were recognized as one of the most important social issues. All the people engaged in the New Culture Movement cared about and participated in the discussion of women's issues. Cai Yuanpei, Chen Duxiu, Li Dazhao, Wu Yu, Hu Shih, Zhou Zuoren, Lu Xun, Zhang Dongsun, Shen Yanbing, and Ye Shengtao had all engaged in the discussions of women's issues and were all advocates and practitioners of women's liberation and progress. There was a column focused on women's issues in *New Youth* magazine. Literature that had far-reaching impacts including Zhen Cao Lun [A commentary on Chastity], Wo Zhi Jie Lie Guan [My view on defending oneself's Chastity] and A Doll's House were published in the magazine. *The Journal of the Young China Association* published the "women's edition" in 1919; The supplements of the *Min Kuo Yir Pao*, including *Consciousness*, *Women's Review* and *Women's Weekly*, became the well-known media for the discussion of women's issues after the May 4th Movement (Yang, 2019). During his studies in the normal school, Mao Zedong strove for knowledge, read extensively, studied numerous Chinese and foreign books, and subscribed to many newspapers. Commenting on the biggest gain from reading, Mao Zedong said, "during this period my political ideas began to take shape. Here also I acquired my first experiences in social action" (Snow, p. 108). His views on women's issue were a part of his political and social thoughts throughout his youth. The political concepts put forward and supported by Mao Zedong were what supported his belief in social revolution. Social action experience included conducting surveys in the rural villages during summer school trips, running newspapers and magazines, writing reviews, and setting up various research groups and societies. It is without a doubt that Mao Zedong had gained a great deal of experience during his studies. He also knew how to write ancient style poetry. In the Ji Mu Wen, Mao Zedong (2020,

pp. 375) dedicated to his mother a pair of couplets and a poem. Poetic and lively, he expressed the deepest love with simple yet vivid words. Mao was a good writer and published many uplifting and inspiring critiques in *New Youth*, *The Shian Kian Weekly Review* and the *Ta Kung Pao* newspaper. His three famous articles, namely The Research on Sports (1917, April 1), The Great Union of the People (1919, July 21) and A Criticism on the Suicide of Ms. Zhao (1919, November 6) were written around the time when his mother passed away. He published nine articles in a row concerning the suicide of Ms. Zhao, to look for the reasons for her suicide and to expound on his views on women's self-reliance, superstitions about marriage, and freedom of marriage. He conducted a deep analysis of the social environment related to this incident and concluded that it was a public event of the human race, which should be concerned about and be studied by all people except those who believed in extreme individualism and celibacy (Mao, 2020, p. 376). It is without a doubt that Mao Zedong's thoughts on women's issues were an essential part of the ideas of women's liberation in the New Culture Movement, in addition to inheriting the enlightened ideas in the New Culture Movement. He also studied and searched for ways to expand women's liberation in specific social systems (Yang, 2019).

Young Mao Zedong's Views on Women's Liberation in His Early Manuscripts

A common theme from Ji Mu Wen to A Criticism on the Suicide of Ms. Zhao is the constraints on women, who had to obey their husbands at the "end of the three cardinal guides." He advocated to understand this problem from the perspective of the whole society. He pointed out that a person's suicide was determined by the environment. In A Criticism on the Suicide of Ms. Zhao, Mao Zedong wrote that the incident revealed the corruption of the marriage system, the dark side of the social system, the impossibility of independent will, and the absence of freedom in love. Ms. Zhao faced a three-sided iron net: the society, her family of origin, and her husband's family. These three nets blocked all her roads so that she was unable to survive and chose to die. The study of Ms. Zhao's suicide was an application of the ideals of Mao Zedong, in which he held that when people discuss various academic theories, they should discuss them in the light of real events. It is also a concentrated reflection of Mao Zedong's thinking on women's issues. This is how Mao Zedong was good at discovering issues in daily life. He analyzed the social ills suffered by all women in the world based on the burden of the social rules and principles that his mother had borne.

First, research is the first step to solving the problems faced by women. He issued seventeen questions for women's issues which was one of the lists of questions proposed in *Wenti Yanjiu Hui Zhangcheng* [The Constitutions of the Problem Research Group] in September 1919. During the May 4th Movement, there was a heated "problems and-isms" debate debate between Hu Shih and Li Dazhao. The debate between the theorists revolved around the concepts of "problems" and "isms." Among researching the problems, introducing theories, and finding the solutions

to problems, they questioned which was of the priority, that is, whether they should solve the "problems" before promoting the "isms," or promote the "isms" before solving the "problems." The "problems and isms" debate was mainly conducted from a theoretical perspective. It did not involve any solution to specific problems but only provided a way of thinking and certain research methods (Yang, 2009). The discussion initiated by Hu Shih had not only encouraged scholarly discussions in academia and the political world but had also drawn the attention of the educated youth to the problems of China at that time and had raised some problems related to the social ills of the times so that they could start to consider possible solutions. In *Wenti Yanjiu Hui Zhangcheng*, Mao Zedong listed 71 problems that had to be studied urgently, but he pointed out that the research of problems must be based on theories. Therefore, before the study of the various problems, it was necessary to study various isms. Mao Zedong systematized the women's issues through research and raised 17 questions that simultaneously involved different aspects. These aspects included women's political participation, women's occupations, women's education, unbinding feet, freedom of love, and contraception. The core of all problems was why women were bullied by men and had never been able to change their status for thousands of years. He conducted physiological and psychological analysis and concluded that the problem stemmed from the physiology of women, and the only problem was reproduction. According to modern ideas, the core of the relationship between men and women should be love, and it should not be controlled by economic benefit. "Considering physical strength, women can do the same jobs as men. However, they cannot work when they are pregnant or taking care of children. This is the main reason why women are suppressed and cannot change their status" (Mao, 2020). For this reason, he pointed out three ways to make women independent. First, women should never get married before they are physically mature. Second, before the marriage, women should acquire enough knowledge and skills that allow them to support themselves. Third, women need to prepare their own living expenses for their use after childbirth. This is the only way for women to stand on their feet, and he called on both young men and women to work hard.

Second, women commit suicide because of social factors. This understanding of Mao Zedong was profound and was formed from a sociological perspective. Émile Durkheim's *Suicide: A Study in Sociology* was published in 1897. In his book, Durkheim did not make moral judgments on suicide. Rather, he studied suicide as an ordinary social phenomenon. This kind of thinking was very influential in China in the era of change. The introduction of sociology into China at the beginning of the 20th century was out of the need for social changes in China. The Beijing Shehui Cujin Hui (Beijing Society for Social Improvements) was established in November 1914. The members aimed to unite the scholars of Beijing, engage in social services, and improve traditional customs. In November 1919, the Beijing Society for Social Improvements founded the *New Society* magazine, which was issued once every ten days. The editors included Zheng Zhenduo, Qu Qiubai, and Xu Dishan. The founders hoped to devote the magazine to the cause of social transformations. Focusing on social transformations, it published articles that advocated

social services, discussed social problems, introduced sociological theories, examined education for commoners, recorded social incidents, and criticized social shortcomings. Among the articles that discussed social problems, the majority focused on intellectuals, females, marriage, labor, and suicide. There were also articles that focused on social surveys, social services, social movements, and social transformations. In short, *New Society* advocated social services, exposed the dark side of society under the rule of warlords from a sociological perspective, and advocated social improvements (Yang, 1987, pp. 44–45). With the deepening of the revolution, the New Culture Movement split into factions. Li Dazhao, who advocated a complete revolution, and Hu Shih, who advocated reform, started the debate about whether China needed a fundamental transformation or focused improvements. They had a consensus on women's issues, in which they agreed that women's issues in China were worthy of attention, but they disagreed on the approaches to solving the problems. Li Dazhao explicitly integrated sociology with social revolution and pointed out that once the economic problems were resolved, any political, legal, family system, and women's liberation problems could be resolved (Yang, 1987, p. 49). The women's issue reflected that Mao Zedong was deeply influenced by the trends of thoughts at that time.

He pointed out that Ms. Zhao did not kill herself and it was a non-suicide (Mao, 2020, p. 376). This is Mao's understanding of the difference. At that time, some people praised the suicide, seeing it as a most delightful and gratifying event (Mao, 2020, pp. 392–393). Some people rejected the idea of suicide. Both views were based on the outlook on life. However, Mao Zedong asked, "Why are there suicides in society?" He believed that in terms of social habits, people celebrate births and mourn deaths, while both are based on and imposed by the fundamental "rules of survival" (Mao, 2020, pp. 390–391). The reason why there were suicide cases in society was that society had deprived these persons of hope so they were completely disappointed. Mao pointed out that as they had no respect for the sentiment of suicide, then they should oppose it. He also listed four possible choices for Ms. Zhao, namely, to survive with intact integrity, struggle and be killed, kill herself, and surrender. Therefore, Ms. Zhao's suicide was only of relative value in terms of preserving her integrity. However, he believed that suicide was "non-suicide." Ultimately, this was a problem caused by the deeply entrenched authoritarian society. He raised a profound question to all people. The head of a woman and the head of a man are actually the same; the waist of a woman and the waist of a man are actually the same, why does a woman have to wear a bun that is flashy and can be easily messed up by the wind? Why does she have to wear a long skirt that can be soaked by mud and water tightly around her waist? It turned out that women are sinners, and that the high buns and the skirts are the instruments of torture put on them. The jewellery on their hands is handcuffs and shackles. Ear piercing and foot binding are equal to physical punishments. Schools and families are prisons. They dare not moan when they are in pain and dare not go out when they are confined. We wonder why women are bullied by men, and cannot change their status for thousands of years? This criticism is really sharp and vivid and has drawn more people's attention to the improprieties caused by the inequality between men and women in

our daily lives. One will not be able to write this criticism without thorough understanding and observation of society. It reflected the self-consciousness of young Mao Zedong in his thoughts and actions.

Third, the small union of women can join to form "the great union of the popular masses." Mao Zedong believed that one of the fundamental methods of social revolution was "the great union of the popular masses." Regarding Ms. Zhao's suicide, some people believed that Mao Zedong was not objective as he put all the blame on the environment and they pointed out that Ms. Zhao's own weakness was the key. Some asked regretfully why she didn't choose to flee? The social environment had made this impossible. Mao Zedong listed eight social phenomena that were commonly seen, and explained the women's issue in a way that was down-to-earth and close to the daily life: (a) There were more than 40 hawker stalls that sold foreign goods in Changsha city, while within 30 Chinese miles of Shaoshan Township where he lived, there were seven or eight hawker stalls that sold groceries. Why was that? (b) Why were there only men's toilets in Changsha city while none were built for women? (c) No women could get into barbershops. Why was that? (d) Why were there no women living alone in the hotels? (e) Why didn't we see any women having tea in the teahouses? (f) Customers usually visit silk and satin shops like Taihefeng and foreign goods shops like Yutaihua to talk about business. Why were there only male customers but no females? (g) All rickshaw drivers in the city were men and there were no women. Why was that? (h) Why were there no female students in the Nanmen Wai First Normal School? Why were there no male students in the Gudaotian First Normal School (Mao, 2020, p. 387)? The eight questions aimed to reveal that women had no social status or space compared with men, whether in occupations, education or daily life. Society had built a net to completely separate the women and the men, and where could the women escape to? He also cited the case of Ms. Mao, who escaped for freedom of love. Ms. Zhao had been proactive in her actions, but she was also "caught, beaten, and scolded" at the end. Can escaping be considered to be easy? The society was so evil, how could Ms. Zhao escape? Where could she escape? He spoke for women from a female standpoint; the great union of the popular masses must be supported by small unions. Mao Zedong believed that human beings had the genius to become united by nature, and there could be big unions and small unions. Unions of women were an integral part of the big unions. Many small unions had common interests and could be combined to become big unions. By looking into history, Mao Zedong concluded that the deep-rooted deficiencies of lay in the fact that people valued self-interest more than cooperation. "The businessmen have no intention to set up companies; the workmen have no intention to set up a labor party, while the scholars follow the old method and close the door to study by themselves without conducting research together" (Mao, 2020, p. 358). It can be said that Mao Zedong had found a bright future for the great union of the popular masses of the Chinese nation in the prospect of women's unions.

Fourth, to strengthen women's education, the funding for men's and women's education should first be made equal. Women's education was a sign of the social progress in the Republic of

China (1912–1949) period, but in reality, how was the women's education during the period of the Republic of China? Mao Zedong compared the funding for women's education with that for men's education. He found that the fixed annual funding was 1.04 million *yuan*,[①] and the temporary funding was more than 1.1 million *yuan*, totaling more than 2.15 million *yuan*. However, the total funding for the two women's normal schools and a temporary middle school was only 100,000 *yuan*, which accounted for only one twentieth of the total education funding. He sighed for the fact that there was no middle school for girls in Hunan with a population of 15 million and pointed out that it was shameful. In the budget of the tenth year of the Republic of China, funds were allocated for the "temporary middle school" (6,000 *yuan* for fixed funding and 4,000 *yuan* for temporary funding.) and he heard that some legislators wanted to cancel the funding entirely (Mao, 2020, p. 492). In the face of these social realities, he believed that the political world had become too old and corrupt, and there was no hope for a political reform. He believed that the people had to ignore everything and open a new path. Mao Zedong picked up a vital point by analyzing the issue of women's education from the perspective of education funding. His father's strict discipline had helped to raise his consciousness. Mao Zedong once told Edgar Snow about how he spent 160 *yuan* when he was a student at the Hunan Provincial No. 1 Normal School. "Of this amount, I must have used a third for newspapers, because regular subscriptions cost me about one *yuan* a month, and I often bought books and journals on the newsstands. My father cursed me for this extravagance" (Snow, 2019). Therefore, Mao Zedong had realized the connection between funding and education since he was a child. Focusing on the details, he advocated that paying lip service was not enough to strengthen women's education. Rather, equality should be realized by eliminating the difference between the funding for women's and men's education. Mao Zedong's characteristics of thinking meticulously and deeply were unique. This also reflected a life skill that had been given to him by his family, especially his father, which was to focus on fine details. "A difficult part for a person to have achievements is to be meticulous. If one can pay attention to all details, one can start from achieving small things and go on to succeed in important issues, so it will not be difficult for the person to become a sage. If one cannot be careful with details, the person will also fail in important issues" (Mao, 2020, p. 541). He did not confine himself to women's issues; rather, he thoroughly examined all aspects of the Chinese society and was able to study women's issues from the perspective of overall connections.

Commentary on Young Mao Zedong's Views on Women's Liberation

Xi Jinping, general secretary of the Communist Party of China Central Committee, said that "Without women, there would be no continuity of the human race or human society. The pursuit of gender equality is a great cause" (2015, September 27). Young Mao Zedong was a thinker of

① *Yuan* is a certain currency during the Republic of China period (1912—1949).

women's liberation, and the ideas in his early manuscripts inherited the new cultural spirit of the May 4th Movement. When we reread young Mao Zedong's views on women's liberation today, we will find their brilliance. Young Mao Zedong's great sense of responsibility and his growth path are reflected in his views on women's liberation. As Xi Jinping emphasized, "The lofty ideals and firm beliefs held by youth are the indestructible driving force of a country and a nation" (Xi, 2021, May 4). It has become a typical model for the growth of youth.

First, young Mao Zedong analyzed women's issues from a framework of history. At the beginning of the 20th century, women's issues had been a global problem. One of the focal points of the debate was to pursue gender equality. During the May 4th Movement, with the re-emergence of the women's liberation movement, a large number of educated women with advanced thinking founded various women's associations to fight for "civil rights" in groups. Mao Zedong was an outstanding representative in the pursuit of equality between men and women. Due to his personal experiences, he sympathized with women and supported women's freedom. In his early manuscripts, the most valuable contribution of Mao Zedong's views on women's liberation were to enrich the discussion of women's issues at all levels. His seventeen questions concerning women's issues were a clear proof of his observations and opinions. He linked women with family, marriage, and social revolution. The issue of women's liberation was a worldwide issue, and a sign of the revolutionary ideology of the May 4th Movement intellectuals. As a modern youth who lived in an era of national transformation, what was profound in Mao Zedong's thought was that he placed the issues of women's liberation into a framework of science and democracy from a social perspective and pointed out that the social factors of women's suicides lie in obsolete thinking. In the article Ying Jiu Chen Duxiu [Rescuing Chen Duxiu], Mao praised Chen as a star in the academic world. He went right to the heart of the matter by pointing out why Chen Duxiu was arrested. He pointed out that China was extremely dangerous in that time, not in the sense of the weakness in the military forces, the insufficient financial resources, or the fragmentations due to civil strife but lay in the extremely empty and corrupt sprit of the population of the country (Mao, 2020 p. 282). This was caused by the underdevelopment of scientific thinking and the lack of democracy. Mao Zedong pointed out that superstitions about marriage could be seen everywhere (Mao, 2020, p. 404). We can see Mao Zedong's extraordinary courage and strategies in his exploration of the solutions to women's issues, as well as his strong sense of social responsibility, which are worth pondering.

Second, the views of women's liberation are the fruits of young Mao Zedong's practice of social surveying. Mao Zedong was an outstanding representative of the Communist Party of China's emphasis on investigation and research. As a young student, he began to conduct investigations and research. During his studies at the Hunan Provincial No. 1 Normal School in 1917 and 1918, Mao Zedong participated in summer "study trips" and visited Changshan, Ningxiang, Anhua, Yiyang, Yuanjiang, Liuyang, and other places in Hunan Province together with his schoolmates. He also worked as a teacher at the night school of a factory. To recruit

more students, he continued to advertise in newspapers and became influential. Young Mao Zedong was directly affected by the theories of Yuelu Academy so that he valued investigation and research. The Academy advocated the spirit of "seek truth from facts," which originated from the practical-learning culture of Hunan. He opposed "empty thoughts" and advocated speaking based on the realities in life and society as well as studying facts and truth (Mao, 2020, pp. 333–334). The views on women's liberation of Mao Zedong came from his continuous observations, research and understanding of society. Young Mao Zedong established groups such as the Xinmin Institute, in order to investigate the circumstances of the country, understand and transform the society, and to ultimately put the theories into practice. Young Mao Zedong aimed at transforming China and the world. From his aspiration and his active participation in organizing work-study programs in France and Russia, we can see his extraordinary aspiration and wisdom. During his five years of study at the Hunan Provincial No. 1 Normal School, Mao Zedong believed that the biggest gain was that "my political ideas began to take shape" and "I acquired my first experiences in social action" (Snow, 2019, p. 108). The political concept mentioned by Mao Zedong was the belief in social revolution. Social action experience included conducting surveys in the rural villages during summer school trips, running newspapers and magazines, writing reviews, and setting up various research groups and societies. It can be said that Mao Zedong had gained a lot of experience during his studies. He closely integrated individuals with society and was eager to do something for the revolution in China and the world. He wrote in a letter to a friend that, if they wanted to do something for the world, of course, they could not get away from the territory of China for that it is necessary to conduct on-site investigations and research. His method in his studies was to value investigations and research and to learn from the "wordless book." This laid a solid foundation for him to later lead the Chinese revolution.

Third, young Mao Zedong's views on women's liberation gleam with the revolutionary essence of Marxism. The Communist Party of China continues to pursue women's liberation and development. The period from the end of 1919 through 1920 was a critical period for Mao Zedong's ideological change. During this period, Mao Zedong accepted many Marxist theories through various channels. He was also affected by Li Dazhao's and Chen Duxiu's research regarding the October Revolution of Russia and Marxism, so his thinking further developed towards Marxism. During his youth, Mao Zedong was inspired by various thoughts and historical figures, and also put a few of his ideas into practice, including anarchism. However, in January 1921, in his speech at the Changsha General Assembly of the Xinmin Institute, he listed five trends of thought that were popular in China at that time for the audience's reference: the school of social policy, the social democracy of the Second International, the fierce method of communism advocated by Vladimir Lenin, the moderate method of communism advocated by Bertrand Russell, and anarchism. After analyzing the pros and cons of these trends of thought, Mao Zedong believed that the fierce method of communism was "the most appropriate" (Chen, 2009). He explicitly stated that for the issues of China, he didn't agree to the solutions without

doctrines, in which only the symptoms but not the disease were treated. He held that there should be an "-ism" that we all abided by and doctrines are like flags. Only when a flag is erected can everyone have expectations and know where to run (Mao, 2020, pp. 497–498). The "-ism" was Marxism-Leninism. Affected by the theory of the Proletarian Revolution of Marxism, Li Dazhao and Chen Duxiu discussed from a high level and advocated that women's liberation and social revolution must go hand in hand. Gradually, young Mao Zedong had more consensus with the historical materialism in Marxism advocated by Li Dazhao and Chen Duxiu. After his surveys in the rural villages of China, Mao Zedong believed that the complete liberation of Chinese women could only be achieved by proletarian revolution. To achieve women's liberation, economic independence would be particularly important. Apart from enriching the content of the women's liberation movement in the May 4th Movement, Mao Zedong's view on women's issues had also provided nourishment for the early development of the Communist Party of China's theories of women's liberation, demonstrating Mao Zedong's political potential and quality as a revolutionary.

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The Belt and Road Initiative: Multilingual Opportunities and Linguistic Challenges for Guangxi, China

Chen Bing*

Guangxi University

Abstract: The Belt and Road Initiative (BRI) is to construct a large unified market, to make full use of both international and domestic markets, and to enhance the mutual understanding and trust of member nations of Association of Southeast Asian Nations (ASEAN) through cultural exchange, people-to-people ties and integration. Geographically adjacent to ASEAN countries and is close to India and Bangladesh in South Asia, Thailand and Cambodia in Southeast Asia, Guangxi Zhuang autonomous region of China is a key littoral or southern gateway for China's BRI. Foreign language planning is an essential element for the social development of a country economically and culturally. By reviewing the implementation of the foreign language policy in Guangxi, I analyzed the multilingual opportunities and linguistic challenges in the region, which shares the cross-border languages with its neighboring countries in the multi-ethnic and multi-lingual community, to reveal the sociological meaning of the foreign language policy beyond its linguistic meaning, and propose an English-plus multilingual policy approach toward the ASEAN countries to meet the current needs of communications associated with the BRI.

Keywords: the Belt and Road Initiative (BRI), multilingual opportunities, linguistic challenges, Guangxi

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*   Chen Bing, School of Foreign Languages, Guangxi University.
    Correspondence concerning this article should be addressed to Chen Bing, School of Foreign Languages, Guangxi University, Nanning. E-mail: cb201209@163.com.

Introduction

The Belt and Road Initiative (BRI) adopted by the Chinese government in 2013 calls for the integration of the region into a cohesive economic area through building infrastructure, increasing cultural exchanges, and broadening trade. The BRI aims to construct a large unified market, to make full use of both international and domestic markets, and to enhance mutual understanding and trust between member nations through cultural exchange, people-to-people ties, and integration. Being one of the largest infrastructure and investment projects in history, the BRI covers more than 68 countries, including 65 percent of the world's population and 40 percent of the global GDP (Xinhua News, 2018). Chinese President Xi Jinping stated the necessity of building modern maritime infrastructure and developing transport routes between China and the ASEAN countries, since Southeast Asia had already been considered as the center of long-distant trade, this region plays an especially important role in the project for China. The "bringing in" and "going global" policies have been integrated to promote domestic openness together with openness to the outside world; thus there is an urgent need for "international talents" that possess the professional expertise and linguistic and intercultural competencies to support the Initiative.

This research focuses on the Guangxi Zhuang autonomous region, which occupies a special position when it comes to implementing the language acquisition policy issued by the Ministry of Education of the People's Republic of China. On the one hand, as the bridgehead of the China-ASEAN free trade area, Guangxi has a unique location advantage. The China-ASEAN Expo (CAEXPO), which is held every year in Nanning, provides a window on the economic and cultural benefits of cross border trade with China's ASEAN neighbors, which aims to better serve the BRI cooperation, has further promoted the construction of the BRI in policy communications, trade exchanges, facility connectivity, funds circulation, and popular support. On the other hand, Guangxi adjoins the Guangdong-Hong Kong-Macao Greater Bay Area, which aims to develop the city cluster into a thriving global center of technology and innovation and an economic hub (China Daily, 2019). Guangxi will pick up strong momentum to spur high-quality development from opportunities found through communicating with the neighboring countries of Southeast Asia, and integrating with the cities of the Greater Bay Area, the thriving engine for regional growth, which will facilitate Guangxi's overall development and create mutual benefits for these regions. Mastering the foreign languages around this region for "international talents" has become one of the significant human resources according to Bourdieu Pierre (1991), and it is now time to make multilingual language acquisition planning a priority if we are to meet the needs of the opportunities and challenges that the BRI has brought about. With the enforcement of the Law of the People's Republic of China on Regional National Autonomy, Guangxi, one of the five autonomous regions for ethnic minorities in China, enjoys the right of autonomy in a wide range of fields: politics, economy, education, science and technology, culture and health, which means that Guangxi's educational institutions enjoy

autonomous rights in formulating language acquisition policies.

The BRI and Guangxi

The BRI aims to build cooperative links to connect China with developing and developed economies along the Silk Road Economic Belt (SREB) and Maritime Silk Road (MSR), which encompass Central, South, and Southeast Asia, as well as Africa, and a route to Europe. There are six economic corridors under the BRI: the China-Mongolia-Russia Economic Corridor (CMREC), the New Eurasian Land Bridge (NELB), the China-Central and West Asia Economic Corridor (CCWAEC), the China–Indochina Peninsula Corridor (linking Southern China to Singapore), the China–Myanmar–Bangladesh–India Corridor (linking Southern China to Myanmar), and the China–Pakistan Corridor (linking South-Western China to Pakistan). The Maritime Silk Road connects Chinese ports to the Mediterranean via Singapore and Africa (Office of the Leading Group for the Belt and Road Initiative, 2018). Physically, in Southeast Asia, China and Myanmar, China and Thailand are linked via the Mekong River, the Kunming-Bangkok Expressway, and the Pan-Asia Railway Network.

In August 2018, China conducted a series of activities to commemorate the five-year anniversary of the inauguration of the BRI. There were two important aspects that developed in the first five years after President Xi Jinping proposed the BRI in 2013. First, there was a change in the geographic definition of the BRI. It expanded from the six corridors and a tentative list of 65 countries to the current 106 countries (including China) in Asia, Europe, the Middle East, Africa, Oceania, and Latin America, that have already signed the Memorandum of Understanding (MoU) of the BRI (Xinhua News, 2018). Second, as President Xi put it in the forum for the five-year anniversary, the BRI is now positioned as the Chinese solution for participating in opening-up and expanding cooperation with the world as well as encouraging improvements in the global governance system. These two developments have clear implications for the ASEAN countries; China will continue to play an active role in improving international trade and in continuing and increasing investments in multi-national projects to improve global governance systems. Furthermore, a bigger BRI family with more participating countries will be more active in proposing and executing BRI projects following the principles of achieving shared growth through consultation and collaboration.

In implementing the BRI, connectivity covers five major areas of interest: policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people ties. Among these, facilities connectivity is the dominant feature of the New Silk Road, in which the Chinese government has invested hugely in developing localized cooperative projects with countries and regions along the routes. To actively integrate into the BRI, Guangxi has initiated efforts to open itself towards the neighboring prime ASEAN countries by prioritizing the construction of the New International Land-Sea Trade Corridor (linking western China to Singapore), which was put forward under the China-Singapore Demonstrative Initiative on Strategic Connectivity in
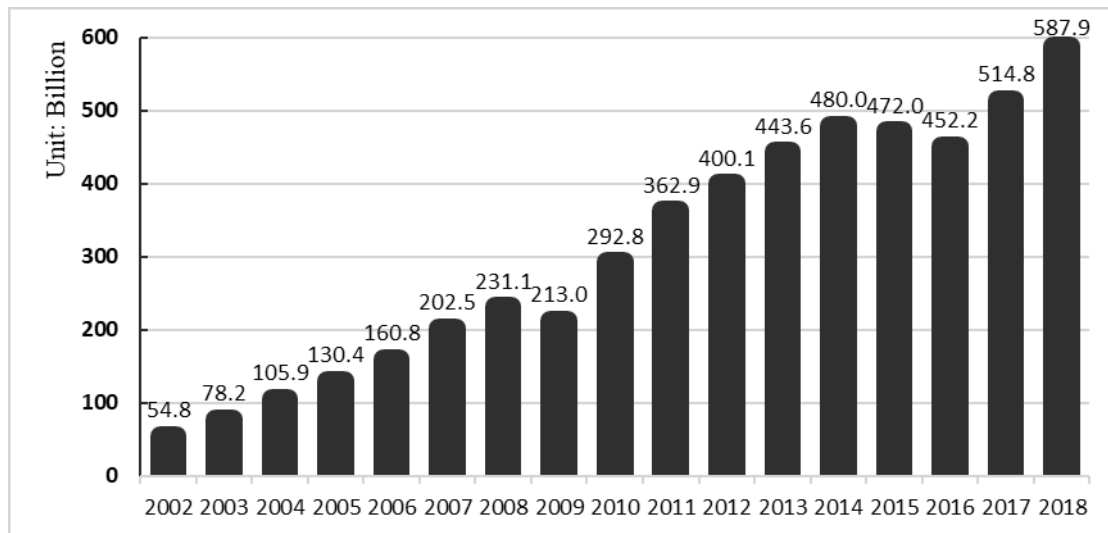
Table 1: China-ASEAN total trade volume from 2002-2018
Data Source: Ministry of Commerce of the People's Republic of China.

2018. President Xi Jinping urged Guangxi to become China's pathway to ASEAN, a new strategic pivot in Southwest and Central China's opening-up, and a dynamic portal connecting the 21st Century Maritime Silk Road and the Silk Road Economic Belt (China Daily, 2018). Held in Nanning consecutively for 16 years, a critical channel for promoting cooperation and exchange between China and ASEAN countries, the China-ASEAN Expo has attracted more than 746,000 traders from home and abroad. In 2018, the region's foreign trade volume reached US$58.79 billion, ASEAN has been the largest trade partner of Guangxi for 17 consecutive years (China Daily, 2019). Table 1 shows the trend of this development.

Besides, Guangxi Beibu Gulf Ports have played a significant role in this land and sea transportation network, with freight train lines to Chongqing and the four provinces of Guizhou, Sichuan, Yunnan, and Gansu, along with cargo ship lines from the Beibu Gulf Ports to Singapore and Hong Kong SAR. Lu Xinshe (formerly the Party Secretary of the Guangxi Zhuang autonomous region) holds that Guangxi is accelerating its infrastructure construction and facilitating multimodal transportation to keep the traffic flowing effectively along the trade corridor connecting China and the ASEAN countries.

Recently, Guangxi started moving towards integration into the Guangdong-Hong Kong-Macao Greater Bay Area, which is expected to facilitate the development of Guangxi in many social aspects and to create mutual benefits for both sides. The plan of the Guangdong-Hong Kong-Macao Greater Bay Area aims to develop the city cluster into a thriving global center of technology and innovation and a regional economic hub (China Daily, 2019). The focus is on transport infrastructure, industrial collaboration, and the flow of human resources as the inflow of technological talents with international vision and competitive capabilities is highly needed to further deepen reform and

opening-up, which will feed the region's economy with investments and advanced technology in the midst of globalization.

In the waves of opportunities and challenges brought by the BRI, new transport infrastructure provides the hardware, while people-to-people ties in the trade and intercultural communication are the crucial software. It is estimated that the total world GDP will rise more than 0.7 percent by 2030 because of increased trade facilitated by the BRI infrastructure. Half of this

Figure 1: The estimated percentages four Southeast Asian countries will gain as a result of increased trade facilitated by the BRI infrastructure.
Data Source: China Daily.

GDP gain will likely flow to BRI economies apart from China. In percentage terms, some Southeast Asian countries will also see sizable gains; Thailand (8.2 percent), Malaysia (7.7 percent), Cambodia (5 percent), and Laos (3.1 percent) (China Daily, 2019). The new trade made possible by the BRI infrastructure is creating a new generation of entrepreneurs and millions of job opportunities. A leading role in the digital economy era, China has become more influential via the integration of Chinese and international talents and by introducing world-class startups. The pie chart will show the percentage of four ASEAN countries.

To meet the current needs of the BRI, all social sections have made a contribution to the Initiative. On the government level, large amounts of money have been committed to tertiary education for cultivating international talents. On the institution level, a multilingual education policy was proposed by the Ministry of Education of the People's Republic of China in its 13th five-year development plan for the national language industry in 2010. Thus, the cultivation of international talents with the mode of "Specialty + Multilingualism," which aims to foster the advanced professionals with special expertise in the necessary fields and with multilingual capacity, has been the priority for foreign language education in the universities. Since then, much attention has been paid to multilingualism for "breaking language barriers between the BRI countries" (Ministry of Education of the People's Republic of China, 2016). Besides, special funds have been granted to aid multilingual exchanges for 10,000 students from BRI countries, alongside the establishment of cultural exchange centers and activities (Office of the Leading Group for the Belt and Road Initiative, 2017).
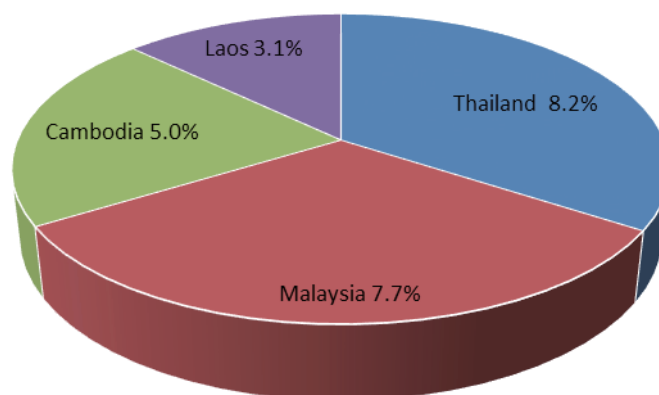
Development of Language Acquisition Planning

Language policy is not only overt but also covert. "Overt" is via laws and regulations given by organizations, and "covert" could be inferred from observed practices (Bamgbose, 2006). R. L. Cooper's (1989) concept of language acquisition planning overlaps with foreign language education

policies, which indicates that language planning activities are directed at the formal educational sector (Kaplan & Baldauf, 1997), and develops various regulations regarding foreign language teaching. The development of language acquisition planning should not only meet the needs of national politics and economics but should also follow the principle of locality that special and regional concerns should be addressed in the layout of language education. From the perspectives of the BRI, especially the opening up policy toward the ASEAN countries, the present language acquisition planning should be adjusted around the Initiative in a way that is specifically tailored to the relationships of the people-to-people ties that are attained through cultural exchanges.

The State Language Commission, the Ministry of Education, and all the governmental agencies concerned have served in the development and implementation of language acquisition planning and monitoring since the founding of the People's Republic of China. In the 50s and 60s of the last century, Russian was taught as the main foreign language. In the late 70s, especially after the reform and opening up, English has been the first foreign language instead of Russian. For almost four decades since then, English has been the sole foreign language being taught and was included in the curriculum from third grade of primary school to the second year of tertiary education, a total of twelve years. Language acquisition policies and planning issued by the national education administration are often in the format of documents titled with planning, syllabus, curriculum standards, or teaching requirements. The following Table 2 lists some of the relevant documents issued by the Ministry of Education (MoE).

Table 2: Relevant documents issued by the Ministry of Education

№	Document	Year
1	Foreign Language Education 7-Year Program Planning	1964
2	Several Points on Strengthening Foreign Language Education	1978
3	Several Suggestions on Foreign Language Major Undergraduate Education Reform Toward the 21st Century	1998
4	The English Curriculum Standard for High School Students	2001
5	The Russian Curriculum Standard for High School Students	2001
6	The Japanese Curriculum Standard for High School Students	2001
7	Guidance on Actively Promoting English Courses in Primary Schools	2001
8	College English Curriculum Requirements	2007
9	English Syllabus for Non-English Major Postgraduate Students (Draft)	2008
10	Catalog of Undergraduate Majors of Ordinary Institutions of Higher Learning	2012
11	Opinions on Deepening Reform of the System & Mechanism of Talent Development	2016

Data source: Ministry of Education (MoE)

According to the newly revised catalog of undergraduate majors in general institutions of higher learning, issued and implemented by the Ministry of Education in 2012, there are 62 majors in foreign languages and literature, including English, German, Russian and French. The Ministry of Education will actively guide qualified colleges and universities to adapt themselves to the needs of national and regional economics and social development and set up foreign language and literature related majors

independently in accordance with the newly revised regulations on the management of undergraduate majors established in ordinary institutions of higher education. In response to the Chinese People's Political Consultative Conference (CPPCC) proposals regarding planning for enhancing national language competence, the Ministry of Education of the People's Republic of China unveiled a plan for the development of the national language industry during the 13th Five-Year Plan period (2016–2020) in 2016, with the aim of matching China's language ability with its overall national strength by 2020. In the implementation of the BRI, the focus has been on innovations and developing international talents with multilingual competence and specialties. In this regard, particular consideration should be given to the training of foreign language talents in non-general languages to meet the current needs of global competition. To study and formulate multilingual foreign language planning, the Ministry of Education has made innovations in language services and training mechanisms for language talents to encourage institutions of higher education to improve the structure of foreign language teaching, and to train and reserve compound foreign language talents in key languages. Moreover, a reserve mechanism for the recruitment of language talents in emergency response and specialized fields has been established, to provide voluntary language services for major international events and disaster relief, and enhance our capabilities in language emergency response and assistance services.

In 2001, the Ministry of Education issued the policy that among English, Japanese, and Russian, the foreign language which is taught in the junior middle school could be one of the three choices mentioned above. In 2017, a policy on foreign language choice encouraged bilingualism in the senior middle school, which includes English, Japanese, Russi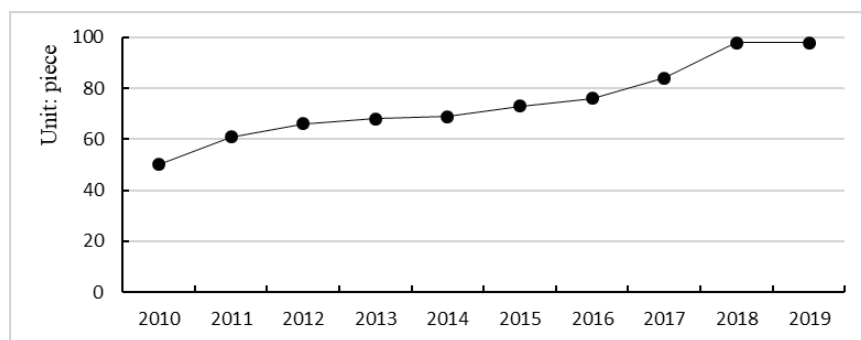an, German, French, and Spanish, to meet the different needs of foreign language acquisition. Based on the Common European Framework of Reference for Languages (CEFR), the Ministry of Education issued the first course standards for German, French, and Spanish for senior middle school. Moreover, multilingualism has been encouraged in the primary and secondary schools of some developed areas. To strengthen the talent cultivation of non-common languages, the Ministry of Education encourages universities and colleges to set up new majors to meet the needs of the BRI. Taking Beijing Foreign Studies University (BFSU) as an example, at present, BFSU offers over 100 foreign language programs and ranks among the top universities in the world for the quantity and variety of language programs with the official teaching of languages and regional studies fully covering the countries involved in the BRI (Beijing Foreign

Figure 2: Language programs established in BFSU from 2010-2019
Data source: Beijing Foreign Studies University

Studies University, 2019).

Multilingual Opportunities and Linguistic Challenges for Guangxi

Here I explore the huge opportunities as well as challenges that the BRI has brought to the development of Guangxi, with particular reference to fostering international talents with both English proficiency and multilingual competence at the tertiary education level, to ensure that Guangxi Zhuang autonomous region, which neighbors the ASEAN countries have competitive human resources with both technical specialties and language capacities to serve for the local economy and culture.

Multilingualism refers to the situation for the use of more than two languages (Swann et al., 2004, p. 214). A well-known definition of multilingualism was given by the European Commission (2007), "The ability of societies, institutions, groups, and individuals to engage, on a regular basis, with more than one language in their day-to-day lives." Multilingual competence refers to the ability of an individual or a speech community to use more than one language in daily communication with the speech community (ibid). Li (2008, p. 4) defined a multilingual individual as "Anyone who can communicate in more than one language, be it active (through speaking and writing) or passive (through listening and reading)." Cenoz, J. (2013, p. 4) holds that "Globalization, transnational mobility of the population, and the spread of new technologies" have contributed to the current visibility of multilingualism, which is highly influential in different political, social, and educational contexts. Globalization has increased the value of multilingualism. Speaking different languages has an added value. As Edwards (2004) pointed out, speaking English can be necessary, as it is the most widespread language in the world, and it is regarded as a language which helps to open doors for better economic and social opportunities, "but the ability to speak other languages none the less ensures a competitive edge" (p. 164). Multilingualism includes multilingual ideology and multilingual order, on which language value and the choice of multilingual education depend (Zhou, 2006). The comprehensive forces of a country and the diffusion of a language are not based on linguistic considerations, but on political, cultural, and economic factors. Multilingualism in response to the BRI is a case in point regarding the multilingual opportunities that Guangxi is facing.

Abram de Swaan (2001) classified the global language system into four categories with an inverted tree diagram: at the bottom are peripheral languages, followed by central languages and super-central languages. At the top are hyper-central languages. In the linguistic map of the ASEAN countries, the top level is English, the international lingua franca, and the sole working language of ASEAN (ASEAN Charter 2007). Under de-colonization and globalization, some ASEAN countries have taken English as their national language, official language and as the medium of instruction in their education systems. Being the super-central languages, and the regional lingua franca as well, Chinese and Malay are in the second level of the linguistic map, with over one hundred million people using them, respectively. The popularization of Chinese in this region is because Southeast

Asia is the most densely occupied area for Chinese, various Chinese cultures like Confucian culture and Na culture integrate and melt together here. Bahasa Malaysia and Bahasa Indonesia, the two important variations of Malay, are mutually intelligible and differ largely only in the occurrence of more Dutch, Sanskrit, and Javanese loan words from Indonesia as opposed to more English loans from Malaysia, along with certain differences in pronunciation (Simpson, 2007). The third level is the central languages, which are the national language of each country in this region. Except for Thailand, all ASEAN countries had been colonized by European and American colonizers. Among the five countries of the Indo-China Peninsula, Vietnam, Laos, and Cambodia had been colonized by France. Thus their national languages, Vietnamese, Lao, Khmer, had also been greatly influenced by French, the former suzerain language. For example, their languages had been Latinized, and there were large numbers of loan words from French. With English globalization, Vietnam, Laos, and Cambodia united to appeal for French to be taken as one of the working languages of the ASEAN countries. Thai, Cambodian Khmer, and Lao are partly intelligible in language communication. In the Malay Archipelago, Filipino, Malay, Bahasa Indonesia, Bahasa Malaysia are the national languages of the Philippines, Singapore, Indonesia, and Malaysia. At the bottom of this linguistic map, peripheral languages are the national languages of some less-developed countries, due to their sluggish economies or because the national language is less used by the population because ethnic languages or vernaculars have gradually reduced the national language to peripheral status. Due to the worldwide spread of English as the international lingua franca in the wave of globalization, which has been pushed by the prevailing internet, many ethnic minority languages have been reduced to peripheral languages or endangered languages.

As for the language situation in Guangxi, there are over 12 ethnic groups with over 69 languages in the Zhuang Autonomous Region (Liu, 2005). Geographically adjacent to the ASEAN countries, with land bordering Vietnam and accessible sea lanes to Malaysia, Singapore, Indonesia, and the Philippines, Guangxi is China's southern gateway to Southeast Asia and enjoys close ties with the ASEAN countries in cultural and customs conventions. Zhuang minorities are homologous with more than 20 ethnic groups in Vietnam, Laos, Thailand, Myanmar, and India, which have ethnically heterogeneous populations with common cultures, languages, and histories and maintain their original ethno-linguistic identities. Among them, five ethnic groups in Vietnam, i.e., Tay, Nung, Nguoi La Chi, Nguoi Pu Peo, San Chay, have a close sibling-like relationship with the Zhuang minority in Guangxi, and cousin-like relationships with the other 15 ethnic groups (Fan, 2005). Similarities in languages, toponymy, folk song melodies, civil religions, and physical anthropology may confirm that Zhuang, Thai (main nationality of Thailand), Lao Loum (main nationality of Laos), and Dai are homogeneous nationalities. Among the eight ethnic groups in the Tai-Kadai language family, the languages of the Zhuang, Bouyei, Dai, Dong, Shui, Maonan, and Li nationalities are similar to Thai. Also, the degree of similarity between the dialects of southern Zhuang and Thai is much higher (Fan, 2003).

The Zhuang minority has become culturally and ethno-linguistically assimilated to a considerable extent through extensive intermarriage and trading cooperation. Yet less attention has been paid to the

lesser-known national languages of the neighboring countries in Southeast Asia. Geographically and linguistically, contiguous people living in the border regions with the same basic ethnic origins should be encouraged to learn their national languages in addition to English in the light of multilingualism and the increasing cooperation between Guangxi and the ASEAN countries in response to the BRI.

With decades of rapid economic development, China's economic impacts on Southeast Asia have been growing through the implementation of the many and varied projects under the BRI, which China is making a significant effort to support. Cooperative opportunities between China and the ASEAN countries along the new Maritime Silk Road (MSR) have been increasing via promoting multilateral trade, offering both capital and technology in infrastructure construction, and strengthening intercultural communications. With the BRI moving ahead steadily since 2013, China and the ASEAN countries enjoy frequent high-level exchanges and ever-deepening people-to-people contact, thus enhancing mutual understanding through friendly connectivity. The tremendous business and employment opportunities generated by the Initiative have emerged, and people with technical skills who are familiar with the languages and cultures of the ASEAN countries are urgently needed. Multilingual international talents are highly welcome in the labor market.

When Bourdieu (1991) identified the sociopolitical implications of the use of different languages, he viewed linguistic practices as a form of symbolic capital, and multilingualism was seen as a socially constructed phenomenon where languages are sets of resources rather than fixed linguistic systems. Thus, English-plus multilingualism as the new linguistic capital is preferable in the current multilingual environment associated with the BRI in Guangxi.

English-Plus Multilingualism for Guangxi

Following the national foreign language education policy, Guangxi has constantly implemented the policy issued by the Ministry of Education, that is, English has been taught as the foreign language from grade 3 of primary school to the second year of tertiary education. Recently, bilingual education with both Standard Mandarin/Putonghua and English as the media of instructions has been popular in the colleges and universities of Guangxi. But, overall, the present language acquisition policy has not taken the geographical and regional factors into consideration when it comes to language planning in dealing with the local situation of Guangxi. This section will discuss the English-plus multilingual planning for Guangxi as it relates to the ASEAN-oriented region under the BRI.

Existing Problems of the Present Language Planning for Guangxi

Guangxi has constantly implemented the foreign language policy issued by the Ministry of Education, and political and ideological concerns have played a great part in shaping English as the main foreign language in Guangxi. Under economic globalization and regional integration, English language proficiency is regarded as an important asset to compete in the labor market. Owing to the four decades of reform and opening-up, Guangxi has witnessed remarkable achievements

in English language education. Often neglected, but not less important is the special locality of Guangxi, which leads to the aspects of structural layouts and language choices. The lack of adequate consideration of regional economic growth makes it hard for the current language acquisition planning to meet the needs of opening up to the ASEAN countries, which are famous for their linguistic diversity with more than 300 ethnic groups and over 1,000 languages, dialects, and vernaculars. According to the 22nd edition of Ethnologue (www.ethnologue.org), Southeast Asia is a special region for sociolinguistic fieldwork, as bilingual and multilingual phenomena prevail. Historical and geographical factors made Indian culture, Chinese culture, and the colonial suzerain cultures of Europe and America meet and integrate within this region. Under the BRI, Guangxi, the southernmost autonomous region bordering the ASEAN countries, has been faced with great multilingual opportunities and linguistic challenges. Therefore, it is high time to facilitate an English-plus multilingual planning for Guangxi in response to the BRI.

The existing problems in the foreign language education policy are obvious. First, top-down processing has been applied in the relevant policy planning. Thus the local regions have no autonomy in policymaking and implementation. Just as the locality has long been neglected, so have the realistic situations and different needs for the talents benefiting regional economic growth and social development. Second, lack of overall planning for a policymaking regional foreign language education equal to English language education. In general, language acquisition planning in Guangxi follows the "English Only" policy, so less attention has been paid to the national languages of the ASEAN countries, although they are geographically adjacent to the Southeast Asian countries.

Thus, the teaching of Vietnamese and Thai, the national languages of the Indo-China Peninsula, has been comparatively greater than the national languages of the other ASEAN countries. With geographical proximity, cultural affinity, and economic complementarity, Guangxi enjoys unique conditions and advantages for learning the national languages of the neighboring countries, but the current foreign language education policy ignores the teaching of the national languages of some small countries in this region. Due to the practical situation, language choice, and supplementary functioning of multilingual education, the special foreign language education policy for Guangxi should be planned in order to boost its social and economic development. Language learners in the cross-border region should be encouraged to learn one or more national languages of the neighboring countries to enrich their linguistic repertoires with multilingual ability, as language competence is regarded as one of the key capitals in human resources.

Also, Malay, the regional lingua franca of five Malay Archipelago countries, has been paid insufficient attention to. Indonesian, a variety of Malay, has only been taught in Guangxi University of Nationalities, in which an Indonesian major exists only at the undergraduate level. Yet the global trend of the widespread use of Malay cannot be ignored. Recently, the five Malay Archipelago countries that speak Malay have united to promote Malay for its unification of language and cultural communications and proposed that Malay should be one of the international lingua franca in the 21st century. A Malay major has been established in many colleges and universities around the world, and

teaching and research on Malay are expanding rapidly due to the promotional activities implemented by the International Malay Council.

Considerations of Foreign Language Planning for Guangxi

From the national macro-level, ASEAN-China relationships are complex, although trade and investment links are generally strong. There is a growing need for China to invest more in foreign countries as domestic labor markets are becoming more competitive and costs are increasing. China has become an important source of much-needed capital for the building of infrastructure in the ASEAN countries. To support ASEAN as a Zone of Peace, Freedom, and Neutrality (ZOPFAN) and ASEAN Centrality as well, each country will surely take their own positions and strive to maximize their own interests when dealing with the complicated multilateral relationships with the superpowers concerned. Obviously, in the co-existence of both competition and cooperation in this region under the BRI, there is a growing significant role for China to elucidate Chinese orientation and initiative to the involved countries in the way of being perceived as a great country with responsibilities. As the second-largest economy in the world, China is faced with the task of telling well its stories, spreading its ideas, and winning the understanding of the international community, particularly in tackling the problem of how to tell China's stories well to its global counterparts, to make China's voice heard, and to improve the international impacts of China's words. Thus, telling China's stories well and constructing Chinese discourse systems through an in-depth study of international discourse systems are becoming increasingly important. Only by mastering the thinking mode of speaking a "global language" can we grasp international discourse power. Chinese is not yet an international lingua franca, and how to appropriately use foreign languages, especially the English language, to construct an international discourse system with Chinese characteristics is an urgent need. Especially for those countries that are skeptical about the BRI, China needs to convince the BRI-impacted nations and regions that the proposal is for win-win cooperation, and to do this, China needs to engage and listen to other countries and regional institutions to make this initiative more inclusive (Choi & Adamson, 2019). To fulfill this great yet difficult task, a large number of talents with international visions and missions, high proficiency both in English and other foreign languages, familiarity with international rules, and professionalism in international negotiations are desperately needed.

The BRI, in terms of China's domestic development, could enable China's vast inland western regions such as Guangxi, Yunnan, and Northwest China's Xinjiang Uygur autonomous region to improve internal economic integration and participate in global trade. Implementing these initiatives will improve inter-regional connectivity for the land-locked western regions and allow them direct access to port facilities in neighboring countries. For example, Guangxi needs cross-border economic links to achieve rejuvenation and economic prosperity. Its land connectivity with the ASEAN countries will be strengthened through cooperation on expressways, railways, and the development of infrastructure for its ports and airports. Guangxi borders Vietnam on land and is close to Thailand and Cambodia in Southeast Asia. This geographical advantage enables Guangxi to serve as an

international gateway or as a connector between China and Southeast Asia, as well as a key littoral gateway for China's BRI.

From the individual micro-level, one's multilingual ability can enhance job opportunities and upward social mobility. Under the BRI, international talents with English plus multilingual proficiencies in the national languages of the ASEAN countries are highly needed in Guangxi. Indo-China peninsula countries such as Vietnam, Thailand, Laos, Myanmar, and Cambodia, which belong to English Expanding Circle countries (Kirkpatrick, 2010), have native languages of Vietnamese, Thai, Lao, Burmese, and Cambodian, respectively. In the Malay Archipelago countries, the official language of Indonesia, Malaysia, Singapore, and Brunei is Malay, which is also spoken in the south of the Philippines. Efforts have been made by the five Malay Archipelago countries to expand the use of Malay to become the regional lingua franca, but also to be one of the working languages in ASEAN. Exchanges and cooperation between Guangxi and the ASEAN countries have been more frequent than ever under the BRI, yet the capacity of dealing with multilingual and multicultural issues with the relevant countries needs improvement. Figure 3 shows the growth trend of students majoring in national languages of southeast Asian countries in Guangxi.

Guangxi is in urgent need of multilingual talents who are proficient in English (the sole working language of the ASEAN countries), Malay and Chinese (the regional lingua franca), and the national languages of the ASEAN countries to keep current in regional communications. During the process of integration, the relations between nations in ASEAN

Figure 3: The number of college and university students in Guangxi majoring in the national languages of Southeast Asian countries from 2012-2018
Data source: The official website of Gaokao

have become extremely complicated, as the infiltration and integration of mutual languages and cultures have been unavoidable. Thus, considerations must be taken when it comes to foreign language planning for Guangxi. The aspects of globalization and regionalization must be covered in policy-making. Multilingualism is a strategic resource needed to deal with globalization, and from the perspective of regional planning, Guangxi, the national minority autonomous region bordering the ASEAN countries, should adopt English plus multilingualism for the sake of cultural soft power and poverty alleviation via language acquisition planning.

From the institution level, currently, Southeast Asian languages which have been taught on tertiary education in Guangxi are in the following three levels: junior college, undergraduate and

postgraduate. Concerning foreign language teaching, there are a total of 78 universities and colleges in Guangxi. Among them, there are 38 undergraduate universities and 40 junior colleges. About 14 universities and colleges have set up Southeast Asian language majors, with more than 3000 graduates each year. Among them, there are 18 schools for Vietnamese major; ten schools for Thai major; three schools for Khmer; Lao, Burmese and Indonesian have been taught only in Guangxi University for Nationalities, the sole tertiary institutions of education conferring university-level qualifications, teaches Bhasa Indonesia in the undergraduate level, which is far from enough comparing with the pressing needs (The Department of Education of Guangxi Zhuang Autonomous Region, 2019). Look at the following Table 3.

Table 3: Main national languages of the Southeast Asian countries being taught in the colleges and universities of Guangxi.

No	Colleges and Universities	Languages	Program Duration
1	Guangxi University for Nationality	Vietnamese, Thai, Indonesian, Malay, Lao, Cambodian, Burmese	3 or 4 years
2	Guangxi University of Foreign Languages	Vietnamese, Thai, Indonesian, Malay, Cambodian	4 years
3	Guangxi University	Vietnamese, Thai	4 years
4	Nanning Normal University	Vietnamese, Thai	4 years
5	Guangxi Vocational College of International Business	Vietnamese, Thai	3 years
6	Guangxi Normal University for Nationalities	Vietnamese, Thai	3 years
7	Acacia Lake College Guangxi University for Nationalities	Vietnamese, Thai	4 years
8	Guangxi Agricultural Technology Vocational College	Vietnamese, Thai	3 years
9	Nanning College for Vocational Technology	Vietnamese, Thai	3 years
10	Baise University	Vietnamese, Thai	4 years
11	Guangxi City Technology Vocational College	Vietnamese, Thai	3 years
12	Guangxi Economic Management Cadre Institute	Vietnamese	3 years
13	Lijiang College of Guangxi Normal University	Thai	3 years
14	Qinzhou University	Thai	4 years

Data source: 2018 College Entrance Examination Enrollment Plans of Colleges and Universities in Guangxi

From Table 3, we see that the last three of the 14 colleges and universities mentioned offer only one national language of the Southeast Asian countries. Most of the colleges and universities, nine to be exact, offer both Vietnamese and Thai language acquisition programs. Guangxi University of Foreign Languages, a privately-run university, is the second batch of the national undergraduate universities as well. Furthermore, among the five Southeast Asian national languages, the Vietnamese and Thai majors ranked first and second respectively in the competitiveness ranking of China's undergraduate education universities in 2015 (Guangxi University for Foreign Languages, 2019). Guangxi University for Nationalities offers the most language programs in Southeast Asia; there are seven majors for the national languages of the Southeast Asian countries. As the first undergraduate talents cultivating base of non-common languages in Guangxi issued by the National Ministry of Education, Guangxi University for Nationalities is also famous for its teaching and research regarding the languages

and cultures of the Southeast Asian countries. Separated from the School of Foreign Languages in 2013, the School of Southeast Asian Studies was set up in 2014 and offered seven majors for the national languages of the Southeast Asian countries: Vietnamese, Lao Thai, Cambodian, Burmese, Bahasa Indonesia, and Bahasa Malaysia. There are 637 undergraduate students and 44 postgraduate students, and a total of well over 1,000 full-time students in the School of Southeast Asian Studies in 2019 (Guangxi University for Nationalities, 2019). Among them, the non-common language major graduates of the national languages program of the Southeast Asian countries, such as Vietnamese, Thai, and Indonesian majors, are on the top of the employment list with an employment rate of 100 percent. Usually, graduates find work in higher education institutes for language teaching and research or in the field of diplomacy, tourism, economics, publication, radio and TV, foreign trade, business, etc. In the required courses, language research focuses on linguistics and translation, while cultural research focuses on literature and cultural anthropology. Besides, almost all the graduate students pass the College English Test, Band 4 (CET4), and over one-third of the graduate students pass the CET6 in English proficiency. While in the national languages program, majors of the Southeast Asian countries students are required to be certified as proficient in their languages before graduation. Therefore, graduate students are trained to be successful international talents with English plus multilingualism abilities.

As the south gate of China, Guangxi, one of the five autonomous regions on the provincial level, is a dwelling place of 12 ethnic groups. Ethnic minority communities are granted a certain degree of autonomy in government, education, and other aspects of socio-economic life by the Constitution of the People's Republic of China. The government and legislative bodies in the autonomous areas have the power to pass laws and issue executive regulations that are adopted for special local circumstances so long as they do not violate state laws and regulations. The multilingual policy aims to encourage people to learn and use two foreign languages besides their mother tongue to help protect the cultural diversities through various means such as language acquisition programs, sponsoring translations of literal works, preserving regional dialects and ethnic minority languages. Therefore, for the sake of its unique geopolitical relations, cultural soft power and language services for the ASEAN countries should be taken into consideration when it comes to the planning of language acquisition policy in Guangxi.

Based on this analysis, language acquisition planning for Guangxi should be adjusted and re-planned in response to multilingual opportunities and linguistic challenges related to the BRI. Measures should be taken to strengthen English proficiency to cultivate competitive talents in the labor market. Also, more of the non-common languages of the neighboring countries should be taught, such as Khmer, Lao, and Burmese, with the ultimate aim of covering all the national languages of the ASEAN countries. Furthermore, attention should be paid to the teaching and learning of Malay (including Bhasa Indonesia and Bhasa Malaysia), the regional lingua franca and a proposed working language of the ASEAN as well. By expanding language acquisition of English plus multilingualism, we can better cope with the dynamic situations that develop during the implementations of the BRI,

promote social and economic development, enrich the linguistic repertoire of people in the Guangxi Zhuang autonomous region for poverty alleviation, better increase cultural soft power in cooperation with our Southeast Asian counterparts under the BRI, all via appropriate planning of foreign language acquisition policies in Guangxi.

Conclusion

China has recognized that in the globalized world, only truly multilateral solutions are appropriate as they allow cooperation and cultural interactions within the regions that have the potential to create enormous opportunities for all entities involved. After two decades of rapid growth, China is again looking beyond its borders for investment opportunities and trade. For China, it is an effort to initiate a big project with global implications. China needs to convince the BRI-impacted nations and regions that the proposal is for win-win cooperation.

UNESCO supports and encourages member states to promote inclusive education and sustainable development while promoting cultural and linguistic diversity via implementing multilingual policies in the education systems. As languages play an important role in understanding different cultures and achieving the UN goals of education for all, UNESCO has developed an action framework to promote inclusive language policies and sustainable development of multilingual education. China has always been at the forefront of promoting language diversity and promoting cross-cultural communications and mutual learning among civilizations through multiple languages.

Inspired by the multilingual language policy of the European Union, which encourages Europeans to learn and use two foreign languages in addition to their mother tongue, and based on the multilingual practice in Guangxi, this study analyzed the current situation of multilingual opportunities and linguistic challenges that Guangxi has encountered due to its unique geographical position. This paper proposes that English plus multilingualism programs be incorporated into the Guangxi language acquisition planning in response to the BRI from the perspectives of governments, educational institutions, and individuals, and suggests how multilingualism is promoted through language acquisition planning in relation to the BRI in Guangxi.

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Uncovering Hidden Fiduciaries in South Korean Private Law

Ying–Chieh Wu*

Seoul National University

Abstract: This article attempts to extend the list of fiduciary relationship by unlocking some of the hidden fiduciaries in other areas of South Korean private law. The reason for this is as follows. The exact label of "fiduciary relationship" may not be widely used, but the underlying mechanisms can be found in many other legal relationships under South Korean private law. Through the clarification of the types of fiduciary relationship, even though it may not be complete, we can come to understand when the fiduciary duty (or the duty of loyalty) and remedies for its breach should be applied. This article shows us that the following should be considered to be fiduciary relationships in addition to trustees and company directors: agents, mandataries, parents and adult guardians, executors of inheritance, commission agents, and partners. It must be stressed that the list is not yet closed. There is always the possibility for a new candidate being added to the list. Like cases must be treated alike, for certainty, systematic consistency, and legal stability are vital for any legal system.

Prologue

The term "fiduciary or fiduciary relationship" is not unknown to South Korean lawyers. However, only trust law and company law expressly adopt this jargon since trustees and company directors are considered to be fiduciaries for their beneficiary and company, respectively. Such an approach has caused practitioners and academics alike to perceive that the fiduciary relationship is only confined to the relationships of trustee/beneficiary and director/company.[①] This article attempts to extend the list of fiduciary relationships by unlocking some of the hidden fiduciaries in other areas of South Korean private law. Although the exact "fiduciary relationship" label may not be widely used[②], the underlying mechanisms can be found in many other legal relationships under South Korean private law. Through this clarification, even though it may not be complete, we can come to understand the types of fiduciary relationships and when the fiduciary duty (or the duty of loyalty) and the remedies for its breach should be applied. Like cases must be treated alike as certainty, systematic consistency, and legal stability are vital for any legal system.

Section II will explore the archetypal fiduciary relationships recognized under the current legal system. It clarifies the scope of fiduciaries, delineates the content of fiduciary duties, and explains the remedies arising from the breach of those duties. Section III utilizes the elements ascertained in Section II as criteria for uncovering hidden fiduciary relationships. Section IV concludes.

Archetypal Fiduciaries

Introduction

This section explores the two well-established fiduciary relationships under South Korean private law, namely, trustees and company directors. I will focus on the following three aspects: how are they made fiduciaries (i.e., the creation issue), what are the obligations they owe as a fiduciary (i.e., the content issue) and, most importantly, what liabilities are imposed upon them should they breach their fiduciary duty (i.e., the remedies issue).

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① *cf.* Lee, J. K. (2016). *Fiduciary law.* Seoul: Samoosa.
② The author cautiously supposes that this is also true of China, Japan, and other non-common law Asian countries. However, analysis of the fiduciary duty abounds in the common law world. *see* Finn, P. (1977). *Fiduciary obligations.* Sydney: the Law Book Company Ltd; Frankel, T. (2011). *Fiduciary law.* New York: Oxford University Press; Conaglen, M. (2010). *Fiduciary loyalty: Protecting the due performance of non−fiduciary duties.* Oxford: Hart Publishing; Birks, P. (1996). Equity in the modern law: An exercise in taxonomy. *University of Western Australia Law Review, 26,* 1; Shepherd, J. C. (1981). Towards a unified concept of fiduciary relationships. *Law Quarterly Review, 97,* 51.

The Creation Issue

Trustees.

There are four methods by which a trust relationship can be created. First, a settlor can enter into a contract with a trustee.[①] A trust relationship is then created by the parties' mutual consent. Common lawyers are sometimes bewildered by such an approach. That is because trusts are not contracts under the common law tradition.[②] However, there is no difficulty in conceptualizing trusts as a type of contract in South Korean private law. This is a jurisdiction, following the traditional civil law approach, where mutual consent suffices to create a contractual relationship. The doctrine of consideration is not recognized. The second way of creating a trust relationship is through the making of a will.[③] Through this method, a settlor can create a trust via a unilateral manifestation of intent. The third means a settlor can use is to declare himself as the trustee of the trust he intends to create. The creation of a trust by self-declaration of trust was adopted in the 2011 reform of the Trust Act of the Republic of South Korea (KTA). This is a novel means and has rarely been used, for people are not familiar with it. The fourth is irrelevant to the parties' autonomy. A trust may be imposed by a statute. When a trust relationship terminates, the KTA imposes a trust upon the exiting trustee for the remainderman.[④] The trust in this case is created by the operation of law and is a statutory trust.[⑤] Thus, a trust-based fiduciary relationship can be generated by mutual consent, a unilateral manifestation of intent, or by the operation of law. Let us turn to the case of company directors.

Company directors.

Company directors are appointed at a general meeting of shareholders.[⑥] The appointed directors would, if they accept the position, then conclude a contract of mandate (i.e., delegation) with the company. The Commercial Code of the Republic of Korea (KComC) prescribes that the provisions of the Civil Code regarding mandate shall apply mutatis mutandis to the relationship between the company and the directors.[⑦] The contract of mandate is provided from articles 680

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① Art. 3(1)l of the Trust Act of the Republic of South Korea (KTA). (Official trans. Ministry of Government Legislation, National Law Information Center, Republic of Korea), available at https://www.law.go.kr/engLsSc.do?menuId=1&subMenuId=21&tabMenuId=117&query=Trust%20Act# (last accessed 15 July 2021). Note that the present author will not strictly quote from the official translation where it fails to convey to the English reader the nuances of the texts in the original language. Some minor modifications will thus be made if necessary.

② Trusts are not contracts in common law jurisdictions; *cf.* Langbein, J. H. (1995). The contractarian basis of the law of trusts. *Yale Law Journal, 105*(3), 625. For criticisms of Professor Langbein's view, *see*: Hansmann, H., & Mattei, U. (1998). The functions of trust law: A comparative legal and economic analysis. *New York University Law Review, 73*, 434; and Getzler, J. (2002). Legislative incursions into modern trusts doctrine in England: The Trustee Act 2000 and the Contracts (Rights of Third Parties) Act 1999. *Global Jurist Topics, 2*, 13.

③ Art. 3(1)2 of the KTA.

④ Art. 101(4) of the KTA.

⑤ Constructive trusts are not recognized in South Korea since courts have no power or jurisdiction to create or impose a trust upon the relevant parties. Judges must find grounds from legislation. This also implies that constructive trusts are virtually not allowed under the civil law tradition. There are, if any, only statutory trusts.

⑥ Art. 382(1) of the Commercial Code of the Republic of South Korea (KComC). (Official trans. Ministry of Government Legislation, National Law Information Center, Republic of Korea), available at https://www.law.go.kr/engLsSc.do?menuId=1&subMenuId=21&tabMenuId=117&query=%EC%83%81%EB%B2%95# (last accessed 15 July 2021).

⑦ Art. 382(2) of the KComC.

to 692 of the Civil Code of the Republic of Korea (KCivC).[①] It is one of the special (or typical) contracts enshrined in the KCivC. So, both the KComC and KCviC have relevant provisions regarding company directors. The provisions of the KComC take priority since it is a special act to the KCivC. The conclusion of a mandate contract is the way to create a fiduciary relationship between the appointed company directors and the company. It must be noted that, unlike the trust relationship, the way by which the fiduciary relationship between the appointed director and the company can be created is confined to the parties' mutual consent. There are no directors created by a unilateral manifestation of intent or by operation of law.

Inductive analysis of the aforementioned two archetypal examples of fiduciary relationships tells us that fiduciary relationships under South Korean private law can be created by mutual consent (i.e., a contract), by a unilateral manifestation of intent, or by operation of law. The next question that needs exploring is what fiduciary duties are imposed upon them once they become a fiduciary, namely, the content issue.

The Content Issue

Trustees.

The KTA imposes various duties upon trustees.[②] But not all of them are fiduciary in nature. The one that they owe as a fiduciary is the duty of loyalty. Article 33 of the KTA provides for the duty of loyalty. It requires all trustees to perform trust affairs solely for the interests of the beneficiaries. This provision, however, does not offer us any information as to standards that can guide trustees about what they ought to do. The provision is, therefore, hollow. It is not a free-standing duty. It only holds meaning when combined with articles 34 and 36 of the KTA, respectively dealing with the no-conflict rule and the no-profit rule. The duty of loyalty is a higher concept that encompasses the no-conflict and no-profit rules.[③] The content of the duty of loyalty is therefore comprised of these two limbs. By prohibiting all trustees from being in conflict-causing situations and from obtaining any profits from the trust, they may be led to act for the sole interest of their beneficiaries. It is, therefore, both proscriptive and prophylactic. Let us now consider the first of the two limbs of the duty of loyalty, namely the no-conflict rule.

The no-conflict rule is enshrined in article 34 of the KTA. Article 34(1) provides that no trustees are allowed to engage in any of the following conduct in anyone's name:[④] (a) transferring trust property or any rights relating to trust property to themselves; (b) transferring their private

① Official trans. Ministry of Government Legislation, National Law Information Center, Republic of Korea, available at https://www.law.go.kr/engLsSc.do?menuId=1&subMenuId=21&tabMenuId=117&query=# (last accessed 15 July 2021).
② For example, the duty of care (art. 32), the duty of loyalty (art. 33), the duty against conflicting acts (art. 34), the duty of impartiality (art. 35), the duty not to profit (art. 36), the duty of segregation (37), duty to prepare, preserve, and keep documents (art. 39), the duty of delegation (art. 42), etc.
③ This is also true of Chinese and Japanese trust law, *see* Zhou, X. M. (2017). *Trust law: Theory and practice* (pp. 276-270). Beijing: China Legal Publishing House; Zhao, L. H. (2015). *Trust Law in China* (pp. 309-312). Beijing: China Legal Publishing House; Makoto, A. (2014). *The law of trust in Japan, 4th edn* (pp. 256-279). Tokyo: Yuhikaku; Hiroto, D. (2017). *Trust law* (pp. 203-235). Tokyo: Yuhikaku.
④ Unless the trust instrument permits, the beneficiaries have given their fully informed consent, or a court order is given (art. 34[2]).

property and any rights relating to their private property to trust property; (c) transferring trust property from one trust held by the trustee to another trust that the trustee administers; (d) representing a third party in a dealing concerning trust property that the trustee administers; and (e) Any other acts that are against the interest of the beneficiaries. The first and second are concerned with the prohibition on self-dealing. The third bars the trustees from making dealings between trusts under his control. The fourth inhibits trustees from making any dealings as a third-party's agent regarding trust property they administer. This is in accordance with the proscriptive rule that the same person cannot represent both parties of a dealing. The fifth covers those miscellaneous occasions where the interest of the beneficiaries might be affected. The most commonly recognized cases are:[1] first, when trustees exploit an opportunity that they should use for the trust they administer (i.e., purchasing land that should be bought for the trust); second, when trustees run a business competitive with the trust business (i.e., running a business identical to that of the trust); third, when trustees breach the duty of confidence (i.e., misuse of confidential information relating to the trust under their control); fourth, when trustees dispose of trust property to a third party at an unreasonable price. The main purpose of article 34 is to deter trustees from putting themselves in situations where their, or a third party's interest and the beneficiaries' interest may conflict. However, those regulated in article 34(1) are in no way exhaustive. It remains to be seen how its future development unfolds.

As for the no-profit rule, article 36 prescribes that no trustees are allowed to obtain any profits when administering the trust. The typical profits regulated by this article are:[2] first, the trust property itself or any other profits flowing from the administration of trusts; second, bribes or secret commissions provided by a third party dealing with trustees. To elaborate, trustees are inhibited from taking trust property or any proceeds flowing from it unless otherwise provided in the trust instrument. For example, if trust instruments provide that the trustee can receive remuneration from trust property or its proceeds.[3] Moreover, trustees are not allowed to accept any secret bonus, commission, or any other benefits from a third party with whom they are dealing. This is mainly to remove any temptation to pursue their own interest since it might affect the adequate administration of the trust.

Company directors.

Company directors are also fiduciaries. They owe a fiduciary duty (i.e., the duty of loyalty) to their company.[4] The KComC embodies the two limbs of the duty of loyalty: the no-conflict and no-profit rules. The former is subdivided into the following three categories. First, company

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① Wu, Y. C. (2021). *Trusts Law* (p. 225). Seoul: Hongmoonsa; Choi, S. J. (2019). *Trust Law* (p. 321). Seoul: PYbook.
② Wu, Y. C. (2021), *Trusts Law* (p. 232). Seoul: Hongmoonsa; Choi, S. J. (2019). *Trust Law* (p. 328). Seoul: PYbook.
③ Art. 47 of the KTA provides that trustees are only allowed to receive remuneration when allowed in the trust instrument. However, trustees are entitled to receive remuneration if they assume trusts as business trustees.
④ Art. 382-2 of KComC. For the analysis of the company director's duty of loyalty, *see* Lee, J. H. (2015). Directors' fiduciary duty in Corporation Law. *Chonnam Law Review, 35*(1) 81; Choi, S. J. (2011). Rethinking the duty of loyalty. *Journal of Business Administration & Law, 12*(4), 1; Kim, B. Y. (2005). Revisiting duty of loyalty and fiduciary duty. *Commercial Law Review, 24*(3), 61.

directors are not allowed to make self-dealings[1] unless a fully informed consent is given by the board of directors.[2] Self-dealings are, in principle, barred. Second, company directors are not allowed to release any confidential information relating to the business, namely, the duty of confidence is levied on them.[3] Thirdly, the duty not to compete is also imposed upon company directors. No directors shall, without the approval of the board directors, engage in, on his/her own account or on the account of a third party, any transaction in the same type of business of the company or become a general partner or a director of any other company, the business purposes of which are identical to those of the company.[4] Fourth, no directors shall use business opportunities of the company likely to be of present or future benefit to the company for themselves or a third party unless approval is given by the board of directors.[5] Business opportunities here denote those that became known to the directors in the course of performing their duties and those closely related to the business that the current company is dealing with or will soon be dealing with.[6] Company directors are therefore not permitted to exploit business opportunities of the companies they work for. The no self-dealing rule, the non-competition rule, and the no-exploitation rule fall under the umbrella of the no-conflict rule.

As for the no-profit rule, the KComC does not have an independent and general provision like article 36 of the KTA. Instead, it allows an innocent company to claim profits obtained by its director who has breached the duty not to compete or the duty not to exploit business opportunities. Such claims are premised on the no-profit rule. By awarding remedies to the innocent company, the KComC indirectly prevents company directors from procuring any unallowed profits. I shall return to this in more detail when I examine remedies.

As explained above, the duty of loyalty is the most important fiduciary duty owed by both trustees and company directors. It comprises the no-conflict rule and the no-profit rule.[7] Both rules are aimed at promoting the interest of the beneficiary and of the company. This is done by not permitting trustees or company directors to favor their own interest or the interest of a third party, or to gain any profits when managing a trust or a company. The fiduciary duty is thus prophylactic. However, a prophylactic rule is effective only if proper remedies can follow its breach. The KTA and KComC, therefore, provide beneficiaries and companies with some powerful remedies, to which I now turn.

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① This includes the case where the self-dealing is made under another's name (this is regarded as indirect self-dealing), *see* art. 398 of KComC.
② Art. 398 of the KComC.
③ Art. 382-4 of the KComC.
④ Art. 397 of the KComC.
⑤ Art. 397-2 of the KComC.
⑥ Art. 397-2, items 1 and 2 of the KComC.
⑦ This is also true of the duty of loyalty in the common law world, *see Bray v Ford* [1896] AC 44; *Bristol and West Building Society v Mothew* [1998] 1 Ch; Finn, P. (1977). *Fiduciary obligations* (pp. 199-200). Sydney: Law Book Company; Sealy, L. S. (1962). Some principles of fiduciary obligation. *The Cambridge Law Journal, 21*(1), 69; Conaglen, M. *Fiduciary loyalty: Protecting the due performance of non−fiduciary duties* (p. 61). Oxford: Hart Publishing.

The Remedies Issue

Trustees.

If the fiduciary duty is contravened by a trustee, the KTA provides the beneficiary with four remedies. According to article 43(1) of the KTA, the beneficiary may hold the trustee liable for restitution or for damages: article 43(2) of the KTA provides for the trustee's duty of disgorgement of profits. Furthermore, article 75 of the KTA awards the beneficiary the right of rescission, that is, the beneficiary is entitled to rescind the deal concluded between the trustee and a third party. However, this does not mean the beneficiary can assert all remedies simultaneously. He or she must choose the right remedy or remedies suited to the case. Article 43(1) of the KTA prescribes that, where a trustee breaches his/her duties, incurring any loss to the trust property, the beneficiary may hold the breaching trustee liable for restitution of the trust property dissipated, unless the restitution is impossible, highly difficult, requires an excessively high cost, or other circumstances make restitution inappropriate. In these cases, the beneficiary is entitled to damages.

Thus, the principal remedy is restitution. Damages are secondary. They are mutually exclusive. In the case of self-dealing, the transaction itself is void.[①] So, the trustee is obliged to make restitution by retransferring the disposed trust property back to the trust account. If restitution is not possible, the beneficiary can claim for damages. However, both legislation and courts remain silent as to the effect of cases where trustees act as agents for the other party and where a trustee conducts a dealing between the trusts under his control. It is submitted that they should be treated the same as self-dealing cases, for they are de facto identical in nature as only one person, i.e., the trustee, is involved in the illicit dealings. Therefore, transactions in these latter two cases should also be considered void. A trustee's liability for restitution then follows. The beneficiary may ask for damages if restitution is not possible. It must be noted that the remedy of disgorgement of profits is not mutually exclusive with restitution and damages. For example, a trustee has concluded a deal in relation to trust property he is holding in favor of a third party. In this deal, the trustee acted as the third party's agent, and the trustee received some secret commission in return. The trustee would be liable for disgorgement of profits (that is, the secret commission) to the trust. The fact that the trustee is held liable for restitution or for damages does not affect his liability to disgorge the profits he obtained. This typically happens when the two limbs of the duty of loyalty are both contravened.

In cases where trustees exploit an opportunity that they should have used for the trust they administer, where trustees run a business competitive with trust business, and where trustees breach the duty of confidence but no dealings concerning trust property are involved, only breach

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① The KTA remains silent regarding the effect of self-dealing. But the Supreme Court of the Republic of Korea (hereafter "the Supreme Court") regards such a transaction as void (Judgment of the Supreme Court 2011.6.10 2011DA18482).

of the no-profit rule is relevant. If any profits have accrued from such breaches, article 43(2) shall apply; that is, trustees would be liable to disgorge the profits they procured.

Finally, when a trustee has disposed of the trust property at an unreasonable price to a third party whom he did not represent, the deal itself is not void because the third party is not represented by the trustee. The fact that the trustee has favored the third party may constitute a breach of the duty of the no-conflict rule. But the third party may be a bona fide purchaser. A balance must be struck. Therefore, article 75(1) of the KTA provides that the beneficiary is entitled to rescind the deal concluded between the trustee and a third party if the third party knew or should have known that the trustee entered into the deal in violation of the trust. Therefore, the beneficiary is accorded the right of rescission if the trustee dispose of trust property in breach of the trust under his or her administration. In fact, the beneficiary's right of rescission is not confined to breaches of the no-conflict rule. The beneficiary's right of rescission is given whenever the trustee makes any dispositions not allowed by the trust. So, it can also accommodate the case under discussion. It goes without saying that the right of rescission and the disgorgement of profits can overlap. They are not mutually exclusive. If the trustee receives any secret reward for making a deal advantageous to the third party, he or she must disgorge that profit to the trust. Whether the beneficiary rescinds the deal made between the trustee and the third party has nothing to do with the trustee's liability to disgorge the profits.

Company directors.

According to the Supreme Court, self-dealings between a company and an errant director are void.[1] The errant directors are therefore liable for restitution. However, the company cannot defeat a bona fide purchaser who obtained dissipated property from the director. In such a case, the company can only claim damages[2] against the errant company director. Restitution of company property is not relevant when company directors breach their duties not to compete with their companies and not to exploit business opportunities that should belong to their companies. This is because no dealings on company assets are involved. Only remedies for breach of the no-profit rule apply. In other words, if any director has engaged in a transaction on his/her own account in breach of the non-competition rule, the company may, by a decision of the board of directors, deem such a transaction to be made on the account of the company and if he or she has made a transaction on the account of a third party, the company may request the pertinent director to transfer any gains accrued therefrom.[3] By deeming the transaction to have been done by the company, the company is capable of holding the errant director liable for the disgorgement of profits.

Furthermore, where a company director breaches the no-exploitation rule, the benefits earned

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① Judgment of the Supreme court 1984.12.11. 84DAKA1591.
② Art. 399 of the KComC.
③ Art. 397(2) of the KComC.

by the director or a third party from the breach shall be presumed to be damage suffered by the company.[①] Though the law uses the legal technique of presumption, it virtually requires the errant director to disgorge the profits to the company as it would be extremely difficult to rebut the presumption in this case. To conclude, when the no-profit rule is contravened, the ultimate effect is the disgorgement of profits.

Unlocking Hidden Fiduciaries

The Core Elements of Fiduciary Relationships

In the previous section, three questions were explored relating to the two archetypal and fully-fledged fiduciaries under South Korean private law, namely, trustees and company directors. For the creation issue, we have found that both fiduciary relationships can be created by mutual consent (i.e., a contract) while only trusts can be generated by a unilateral manifestation of intent or by operation of law. The point here is that the way a fiduciary relationship can be established varies according to the individual type of relationship involved.

As for the content question, the duty of loyalty is the core obligation that both fiduciaries under discussion owe to their principals respectively, i.e., the beneficiary and the company. The duty of loyalty consists of two sub-rules, namely, the no-conflict rule and the no-profit rule. The former prevents fiduciaries from putting themselves or third parties in a position in which their interest conflicts with the principal's interest (e.g., self-dealing, breaching the non-competition rule or the no-exploitation rule etc.). The latter deters fiduciaries from wrongfully profiting in the course of conducting their fiduciary tasks. Both rules are aimed at promoting the proper administration of trusts or company businesses.

Finally, various remedies are available to the beneficiary or company if the trustee or company director breaches the duty of loyalty. They are: restitution in response to void self-dealings, damages if restitution is not possible or very difficult, and the disgorgement of profits arising from cases where the no-profit rule is breached (i.e., cases in which fiduciaries have received bribes or secret commissions or where the non-competition rule or the no-exploitation rule is breached). The beneficiary also has the right of rescission.

Now we must consider how a fiduciary can be created, the core duties he or she owes to the principal and what remedies ensue once the fiduciary duty is breached. However, both trust law and commercial law remain silent regarding the definition of a fiduciary or the fiduciary relationship. This is unexpected in a civil law jurisdiction. Civilian codes or acts generally offer definitions of the relevant legal institutions that they provide for. Here we can only infer the core elements of fiduciary relationships from the two primary fiduciaries recognized under the local

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① Art. 397-2(2) of the KComC.

legal system. This section will suggest a definition founded on those core elements. However, it must be stressed that the core elements and definitions offered here are not universally absolute. They are merely inferred from the currently recognized fiduciary relationships, i.e., trustees and company directors.

The central question here is: what are the features or characteristics that make the legal relationships of trustees and company directors fiduciary in nature? They must be those that are distinctively embedded in those fiduciary relationships and that can demarcate them from other legal relationships. The core elements will be revealed once they are clarified. In any case, the analysis of creation does not offer any clue in determining the nature of fiduciary relationships since they can be established by both intention and operation of law—mechanisms through which other legal relationships can also be created. Therefore, the modes of creation do not indicate anything distinctively existing only in a fiduciary relationship. Furthermore, remedies in respect of the breach of fiduciary duties are unhelpful as well. Restitution, damages, and rescission are not uniquely designed for fiduciary relationships as we can also find them adopted in other areas of law. On the other hand, the remedy of disgorgement of profits is novel under the civilian legal tradition, where the principle of no-loss-no-compensation dominates. But this remedy is given when the fiduciaries have breached the duty not to profit. Therefore, this analysis shall focus on the content of fiduciary duties.

Trustees and company directors owe various duties to their principals. But only the duty of loyalty involving the no-conflict rule and the no-profit rule is considered fiduciary in nature.[1] This reflects the law's particular concern for protecting the principals' interests. In other words, beneficiaries and companies are in a relatively vulnerable position since they cannot constantly monitor trustees and company directors. This raises the chances that trustees, and company directors may carry out actions that favor themselves (or a third party) ahead of their principals' or seek to procure secret profits. Such possibilities inevitably tempt trustees and company directors more inclined to pursue their own interests. This in turn hampers them from adequately executing their business and is fundamentally contrary to the nature of the position of trustees and company directors on whom the beneficiary and company are dependent. Therefore, vulnerability and dependency are embedded in a fiduciary relationship.[2]

Fiduciaries are destined to work for another person and the law is determined to secure this relationship through the duty of loyalty comprised of the no-conflict rule and the no-profit rule. However, it must be noted that the phrase "working for another" used here holds a rather special connotation. It does not involve all situations in which a person works for another. It is confined

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[1] English law also recognizes these two duties as fundamental components of the loyalty obligation, *see Bray v Ford* [1896] AC 44. 50.

[2] It is submitted that vulnerability is one of the characteristics commonly cited by common lawyers, *see* Miller, P. B. (2014). The fiduciary relationship. In A. S. Gold & P. B. Miller (Eds.). *Philosophical foundations of fiduciary law* (p. 67). Oxford: Oxford University Press; For various opinions on the characteristics of fiduciary relationships in the common law world, *see* Hoyano, L. (1997). The flight to the fiduciary haven. In P. Birks (Ed.). *Privacy and loyalty* (p. 269). Oxford: Oxford University Press.

to circumstances in which there are opportunities (or temptations) for the entrusted person to make self-advantageous decisions when his interest conflicts with that of the principal. This can be inferred from the content of the two limbs of the duty of loyalty. They are designed to protect the economic interest of the principal. Only when the economic interest conflicts can we say a conflict exists between a fiduciary and his principal. Moreover, what the no-profit rule aims at is guiding fiduciaries to concentrate on the business of promoting or securing the interest of their principal. Therefore, that last requirement can be phrased as working for another where there are possibilities for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position. The core of the fiduciary duty of loyalty, i.e., the no-conflict rule and the no-profit rule, reflect this proposition.

Taken together, these distinctive characteristics, inferred from the two fully-fledged fiduciaries under South Korean private law, indicate that the South Korean fiduciary relationship may be defined as a relationship that involves the principal's vulnerability, dependency, and the possibility that the entrusted person may make an economically self-or third party-advantageous decision or to profit from his position. The term "principal" here denotes those whom the entrusted person works for. The entrusted person becomes the fiduciary. If so, questions arise as to whether other fiduciaries exist under South Korean private law since others may also satisfy the above-mentioned characteristics and come within the ambit of the definition of fiduciary relationships. It is submitted that there are at least six legal relationships that potentially fall into the fiduciary category as they possess the required characteristics. These relationships are mandate, agency, parents or adult guardians, executors of inheritance, commission agency, and partnership. Failing to include these within the ambit of the fiduciary relationship would seriously damage the systematic coherence of private law.

Taking Systematic Coherence Seriously

Mandates.

The first instance where a fiduciary relationship can be established is that of the contract of mandate. A mandate is a contract that becomes effective when one person (i.e., the mandator) entrusts the other party (i.e., the mandatary) with the management of affairs with the other party's consent.[①] Is the mandatary a fiduciary, and thus a fiduciary relationship exists between the mandator and the mandatary? No authority confirms this, but I argue it is because the contract of mandate satisfies the three requirements. The nature of the contract itself already signifies that between the mandator and mandatary exists vulnerability, dependency, and possibilities for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position. Once a mandatary deals with affairs for the mandator, the mandatary is situated right at the center of the execution of the relevant affairs. No matter how carefully the mandator

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① Art. 680 of the KCivC.

monitors the mandatary, it remains true that: (a) the mandator, having entrusted his affairs to the mandatary, becomes vulnerable and dependent on the mandatary, and, moreover (b) there will always be room for the entrusted person to make a self- or third-party-advantageous decision when a conflict-of-interest situation arises or to profit from their position.

Recognized examples of mandatary suggest evidence of a fiduciary relationship. We have already seen that the company director, as the mandatary of the company he works for, is a fiduciary. The scope of mandatary covers a variety of persons such as lawyers, estate brokers, fund managers, accountants, doctors etc. Principals in these cases (i.e., clients, investors, patients) are all in a relatively vulnerable situation in that they are dependent on their mandatary in relation to the work entrusted. Moreover, it is possible that a conflict might arise between those mandataries and their principals.[1] These mandatories are fiduciaries. Such a view can further be supported by the recognition of the no-conflict and no-profit rules. For the no-profit rule, the law imposes on the mandatary a duty that requires him to transfer to the mandator all the money and any other things that he has improperly received in the course of management of the entrusted affairs.[2] The Supreme Court further adds that money and other things mentioned here include all the benefits that, if vested in the mandatary, would harm the entrustment relationship between the mandator and the mandatory.[3] For the no-conflict rule, no express provision is enshrined in the KCviC. But the majority view recognizes that a no-conflict rule also applies in a mandatory relationship.[4]

As explored above, the mandate contract satisfies the three requirements needed for establishing a fiduciary relationship: vulnerability, dependency, and the possibility for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position. Furthermore, both the no-conflict rule and the no-profit rule, i.e., the two defining duties owed by the fiduciary are also imposed upon the mandator and the mandatary. To conclude, the contract of mandate creates a fiduciary relationship and mandataries are fiduciaries.

Agency.

The relationship of the agency is created when a principal grants another person the power to perform a juristic act for the principal. It is not a contractual relationship. The agency relationship is established when power is granted to another. The appointed person is free to reject the grant, but if he does not, the agency relationship survives. The typical example of a juristic act entrusted to an agent to do on behalf of the principal is the making of a contract. That is, an agent

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[1] Doctors are also fiduciaries in some common law jurisdictions: *S.E.C. v Willis* (1992) 787 Fed. Supp. 58 (New York); *McInerney v Macdonald* (1992) 93 DLR (4th) 415 (The Supreme Court of Canada).

[2] Art. 684 of the KCivC.

[3] Judgment of the Supreme Court 2010.5.27. 2010DA4561.

[4] Jee-Won Lim, *Lectures on Civil Law* (18th edn, 2021, HMS) p. 1610. (The original Korean title is contained in the bibliography of this article). It must be noted that the majority view remains silent on the strong connection between the no-conflict rule with the fiduciary relationship, despite submitting that agents owe to their principal the duty not to prefer their own interest when conflicted with their principal's. This is mainly due to the fact that the concept of fiduciary duty is comparatively novel within the civil law tradition.

is empowered to make an offer (i.e., a manifestation of intent) or accept (i.e., a manifestation of intent) an offer for the principal. The contract would then be concluded between the principal and the other party. In other words, though the deal is concluded between the agent and the counterparty, the legal effect is vested in the principal.[①] The agent owes no obligations stemming from the contract. This is one of the reasons that even a minor can become an agent.[②] It must be noted that the agency and mandate relationships may overlap. When the mandatary is a doctor, no overlap happens since a doctor generally has no power to perform any juristic act on behalf of the patient. The doctor is only a mandatary. On the other hand, a lawyer may be a mandatary as well as an agent. Lawyers empowered only to suggest legal advice may not be agents. If he is empowered to conclude a deal with another on behalf of the client, he is then both an agent and a mandatary. So is a company director. Finally, an agent can be a minor but not a mandatary since the latter is a contractual relationship. Minors are incapable of entering into contracts without their guardians' approval.[③]

Agents are people acting on behalf of their principals. The relevant act is a juristic act, concluding or rescinding a contract. The legal status of the principal is therefore affected. Whether the act is carried out adequately as required by the principal depends on the agent's proper performance. Principals generally rely on their agent and are placed in a relatively vulnerable position as regards the execution of the task entrusted to the agent, resulting in agents being apt to pursue their own benefit should their interest and the principal's interest conflict. They may even profit from their position. In consequence, it seems the three core requirements for the establishment of a fiduciary relationship are all met in the agent relationship: vulnerability, dependency, and the possibility for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position.

That the agent relationship is a fiduciary in nature is reinforced by the fact that the no-conflict rule is expressly enshrined in law. Article 124 of the KCivC prescribes that, without the consent of the principal, an agent shall not perform a juristic act for the principal to which the agent himself is the other party or shall not become an agent of both parties to one juristic act. The former concerns the duty not to self-deal and the latter involves the duty not to represent both parties in a deal. If these rules are contravened, the Supreme Court considers the deal a void transaction.[④] The law, however, does not expressly provide for the no-profit rule. No problem would arise if the agent were also a mandatary since the no-profit rule, as mentioned above, applies to the mandate relationship. However, if the two legal capacities do not overlap, the question arises whether the no-profit rule applies to a pure agent. Both courts and academics remain silent. It is submitted

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① Art. 114 of the KCivC provides that, (a) a manifestation of intent made by an agent, within the scope of his authority while disclosing the fact that he is acting for a principal, shall directly bind the principal and, (b) this applies to a manifestation of intent made by a third person to an agent (sec. 2).
② Art. 117 of the KCivC provides that legal capacity is not required in order to be an agent.
③ Art. 5(1) of the KCivC provides that a minor shall obtain the consent of his/her representative to perform any juristic act.
④ Judgment of Supreme Court 2018.4.12. 2017DA271070.

that the rule should also apply to the agency by analogy. This is because the agency relationship satisfies the three requirements. In other words, the fundamental and underlying structure of agency can be seen as similar to that of mandate or trust in that they all involve administering affairs for another while there exists a danger that administrators (i.e., the trustee, mandatary, or agent) could profit in the course of managing the affairs entrusted. Following the axiom that like cases should be treated alike, it would be hard to justify not applying the no-profit rule to the case of agency, as with mandate or trust. But without an express provision on the no-profit rule, article 684 of the KCivC or article 36 of the KTA that deal with the no-profit rule for mandate and trust respectively should apply to the agency by analogy.[①] That said, it would be best to expressly provide for this scenario in the near future.

To conclude, the agency relationship satisfies the three requirements of a fiduciary relationship, that is, vulnerability, dependency, and the possibility for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position. Moreover, the KCivC expressly prescribes the no-conflict rule, and the no-profit rule, though not enshrined in law, should be recognized in the agency as well by analogy with mandate or trust. Hence, the two crucial duties that form the duty of loyalty owed by the fiduciary are also imposed upon an agent. The agency relationship is a fiduciary relationship and agents are fiduciaries.

Parents and adult guardians.

Are parents and adult guardians fiduciaries? It is interesting to find that no court decisions or academics have ever raised this question in South Korea. This is partly because the notion of a fiduciary relationship has never extended outside the boundaries of trust law and company law. To argue that both parents and adult guardians are fiduciaries may sound strange to a civil lawyer. However, it is submitted that they are since they are considered to be both agents and mandataries in South Korean private law. Articles 911 and 920 of the KCivC respectively prescribe that the parent who exercises parental authority shall become the agent of his or her minor child and that the person of parental authority who is the agent of the child shall represent the child in juristic acts concerning the property of the child. In other words, those who have parental authority are agents arising by the operation of law. The KCivC in its article 916 further provides that any property acquired under the name of a child shall be the personal property of the child, and such property shall be managed by the person of parental authority who is the agent of the child. This provision, by awarding the right to manage the affairs of their child, treats parents as their children's mandataries. This is also true of adult guardians. Article 938 of the KCivC regards adult guardians as the agent of their ward and article 949 of the KCivC further says that a guardian shall manage the ward's property and represent the ward in juristic acts concerning the latter's property. The upshot is that both parents and adult guardians are agents as well as mandataries in nature. Since both agent and mandatary, as explored above, are fiduciaries, parents and guardians

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① Unlike the common law, in which legislation cannot be applied by analogy, it is generally allowed in civil law, provided adequate grounds are given.

ought to be considered fiduciaries as well. This is understandable in that children and wards are generally in a bad position to monitor parents and adult guardians, resulting in parents and adult guardians being able to put their interests ahead of their principals' or to obtain unallowed profits.

Since parents and guardians are both fiduciaries, the no-conflict rule and the no-profit rule that govern agency and mandate relationships are also applicable to parents and guardians. But, as far as the no-conflict rule is concerned, it is repeated in the KCivC. That is, article 921(1) prescribes that if a person of parental authority, who is the agent of a child, is to perform acts of conflicting interest between himself or herself and his or her child, he or she shall apply to the court for appointment of a special agent on behalf of the child; and (2) where a person of parental authority who is the agent of children, is to perform acts in which the interest of one child conflict with those of the other child, the person of parental authority shall, on behalf of one party, apply to a court for appointment of a special agent. This provision is also applied mutatis mutandis to adult guardians.[①] Parents and adult guardians, though so far rarely thought of in this way, are both fiduciaries.

Executor of inheritance.

When a person dies leaving a will, the will must be executed. The person that executes a will is called the executor of a will.[②] The executor of a will can be appointed either by a will[③] or by a court order.[④] Can executors of wills be regarded as fiduciaries? It is submitted that they can. They are the manager of the deceased person's assets, that is, paying debts, taxes, and most importantly distributing the inheritance to the deceased's heirs according to their shares.[⑤] They manage the affairs of another. But who do they work for? It depends on who owns the assets left by the deceased. The answer is that they work for the deceased's heirs because the rights to assets left by the deceased automatically vest in the deceased's heirs at the moment the person leaving the will dies.[⑥] Executors of wills are mandataries managing assets on behalf of the deceased's heirs. For this reason, the law also recognizes that executors are mandataries by applying some of the provisions on a mandate to executors.[⑦] Furthermore, executors may sometimes need to perform juristic acts on behalf of heirs while managing the inheritance. Hence, article 1103(1) of the KCivC expressly regards an executor of a will, either appointed by a will or by court order, to be deemed an agent for the heirs. Thus, an executor of a will is the heir's agent as well as mandatary. Executors of wills are fiduciaries. It is not surprising that the law has taken such a path since it

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① Art. 949-3 of the KCivC.

② The corresponding concept under common law is the executor or administrator of the estate. However, unlike common law systems (where the term executor is used when he is appointed by a will, whereas the term administrator is used when he is appointed by the court), South Korean law does not make such terminological distinctions. They are both called the executor of inheritance.

③ Art. 1093 of the KCivC.

④ Art. 1096 of the KCivC.

⑤ Art. 1101 provides that an executor has the right and duty to manage inheritance assets and to perform acts necessary for carrying out the will.

⑥ Art. 1005 of the KCivC provides that an heir succeeds all the rights and duties held by the deceased predecessor from the time of the commencement of succession; art. 997 provides that the succession procedure commences by death.

⑦ See art. 1103(2).

can be easily imagined that all three requirements for the creation of a fiduciary relationship are met even in the case of executors of wills. The no-conflict rule and the no-profit rule are thus automatically applicable to executors of wills as well, in order to deter executors from making transactions favoring their interest or from profiting from the administration of inheritance. Executors of wills are fiduciaries and should be added to the list of fiduciary relationships.

Commission agency.

A commercial agent is a person who makes it his business to effect sales or purchases of goods or securities under his or her own name on the account of another party.[1] Therefore, unlike its label, a commercial agent is not an agent since agency requires the agent to implement a juristic act in the name of a principal. Therefore, if a commercial agent concludes a contract, a contractual relationship arises between the commercial agent and the other party, not between the principal and the other party. This is declared in article 102 of the KComC, which says that the commission agent acquires rights and owes obligations with regard to the other party to the transaction. If the commission agent is not an agent in nature, what is it in essence? Article 112 gives us the answer: it is a mandatary. This article argues that the provisions relating to the mandate shall apply mutatis mutandis to the relations between a principal and a commission agent. Such an approach is reasonable in that, even though the contractual parties are the commission agent and the other party, the commission agent is virtually managing the principal's affair. Furthermore, the principle relies on the commission agent in relation to the sale entrusted and thus is in a comparatively vulnerable position in monitoring the deal. As a result, the possibility emerges of a commission agent favoring his own interests and profiting in the course of a relevant sale. Therefore, article 684 of the KCivC dealing with the no-profit rule should apply to the commission agent.

As for the no-conflict rule, the KComC offers a special provision. That is, article 107(1) provides that, to the extent that a commission agent has received a commission to sell or purchase goods or securities having an objective exchange quotation, he or she may directly become the buyer or seller. In other words, the core element of the no-conflict rule, namely, the no self-dealing rule, is in principle not allowed; however, an exception can apply if the relevant products have an objective exchange quotation in the relevant market. The exception is made to facilitate the sale when a fair price is guaranteed.[2] The focus here is that the no-conflict rule is expressly applicable to the case of the commission agency. The commission agency creates a fiduciary relationship and thus commission agents are fiduciaries.

Partnership.

The final legal relationship I would like to add to the list of fiduciary relationships is the contract of partnership. That is, partners can be said to owe each other fiduciary duties. A partnership becomes effective when two or more persons have agreed to run a joint business

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① Art. 101 of the KComC.
② Ok-Rial Song, *Lectures on Commercial Law* (11th edn, Hongmoonsa, Seoul) p. 170.

by making mutual contributions thereto.[①] The contribution (money, land, or chattels) made by each party belongs to the partners jointly.[②] But the manager of the partnership is in charge of the execution of the partnership's business.[③] However, the ordinary affairs (such as purchasing pens, papers, etc.) of the partnership may be managed solely by any partner or any manager acting alone.[④] The manager of a partnership resembles the director of a company. Any partner acting alone for other partners relating to ordinary affairs of the partnership is akin to a mandatary since he or she manages the partnership's ordinary affairs for other partners. Other members of the partnership depend on the manager(s) they have chosen in relation to the execution of the partnership's business or ordinary affairs. The structure is similar to that of mandate and has been adopted by law. Article 707 of the KCivC provides that the provisions of articles 681 to 688 shall apply mutatis mutandis to partners who manage the affairs of the partnership. These are provisions dealing with the mandate. The most important and relevant one here is article 684 that states the no-profit rule. Furthermore, as mentioned above, the mandate is also governed by the no-conflict rule, which is also applied to the partnership. These measures prevent a managing partner from favoring his or her own interests or profiting from the management of the partnership business. Partners of a partnership must be placed on the list of fiduciary relationships.

Conclusion

I intended this article to: (a) extract the core elements of fiduciary relationships from the archetypal and most fully-fledged fiduciaries recognized under South Korean private law (i.e, trustees and company directors); and (b) to use them as criteria for the search of undisclosed fiduciaries. As to the former, I found that the fiduciary relationship under the South Korean legal system contains the following three irreducible core elements: vulnerability, dependency, and most importantly, the possibility for the entrusted person to make an economically self- or third-party-advantageous decision or to profit from his position. I then searched for other legal relationships that might possibly satisfy these three requirements. The analysis indicates that in addition to trustees and company directors, the following should also be considered fiduciary relationships: agents, mandataries, parents and adult guardians, executors of inheritance, commission agents, and partners. It must be stressed that the list is not yet closed. There is always the possibility for new candidates to be added to the list. The concept of fiduciary might not have been widely used in South Korea, but the core elements of the fiduciary relationship are, as explored above, present in several other legal relationships, which constitute a class of hidden fiduciaries. The

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① Art. 703 of the KCviC.
② Art. 704 of the KCviC.
③ The manager of a partnership is elected by an affirmative vote of not less than two-thirds of all the partners (art. 706(1) of the KCivC).
④ Art. 706(3) of the KCivC.

time has come for us to uncover them. It is interesting to find symmetry in common law and civilian systems because in the common law world, trustees,[1] company directors,[2] agents,[3] lawyers,[4] partners,[5] and estate executors/administrators have traditionally been regarded as fiduciaries. Like cases must be treated alike for the sake of clarity, consistency, and legal stability. Ironically, this axiom seems to have been better implemented in the common law tradition insofar as fiduciary law is concerned. But is it not the Civil Law tradition that lays more emphasis on systematic coherence?[6]

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[1] *Re Hallett's Estate*, (1879) 13 ChD 696, 709 (CA).

[2] *Regal (Hastings) Ltd v Gulliver* [1967] 2 AC 134, HL.

[3] *Boston Deep Sea Fishing and Ice Co v Ansell* (1888) 39 Ch.D 389, CA.

[4] *Hilton v Barker Booth Eastwood* [2005] UKHL 8.

[5] *Clegg v Fishwick* (1849) 1 Mac. & G. 294.

[6] The study on the fiduciary duty of loyalty has recently been burgeoning in China since the Trust Law of the People's Republic of China and the Civil Code of the People's Republic of China were enacted in 2001 and 2021 respectively. For more details, *see* Hui, J. (2020). The duty of loyalty in Chinese trust laws. *Journal of Equity, 13*, 347 and Jian, X. L. (2016). The duty of loyalty for the trustee. *Peking University Law Journal, 28*(1), 194. However, most of the articles on this subject mainly concentrate on the meaning and scope of, or the remedies for breach of, the fiduciary duty under trust law or company law. Rarely have we seen any attempts that are aimed to clarify the fundamental requirements for fiduciaries and prove that they may exist in other areas of private law. Thus, the conclusion made in this article would therefore hold particular meaning and importance in China considering that China has also planted trusts law on its Roman-Germanic soil. The present author argues that it is crucial to unlock those hidden fiduciaries in other areas (ex., contract law, family law, the law of succession, company law etc.) of private law in China as well so as to treat like cases alike and secure legal consistency and stability. It is hoped that the argument and reasoning made here would provide local lawyers with a new perspective that could help them have a better understanding of fiduciary law.

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