

## Article

# The Sustainable Development of Financial Inclusion: How Can Monetary Policy and Economic Fundamental Interact with It Effectively?

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Received: 4 April 2019; Accepted: 24 April 2019; Published: 1 May 2019



**Abstract:** It is necessary to analyze the relationship between financial inclusion and circumstances—monetary policy and economic fundamentals, which has a practical reference value for policy makers. This paper studies the impact of the circumstances on financial inclusion factors by using a vector autoregressive method. Empirical results show that monetary policy has a short-term positive impact on financial inclusion factors, while the economic fundamental has the opposite, which means that the positive monetary policy promote the development of financial inclusion in the short term and the sudden change of the economic situation will make it harder. Based on the data of the World Bank and the situation of China, we make an analysis and comparison of the empirical results, and draw two implications: first, the sustainable development of financial inclusion needs a suitable circumstance; second, the appropriate coordination and mutual facilitation of economic fundamentals and finance is conducive to the sustainable development of financial inclusion.

**Keywords:** financial inclusion; sustainable development; monetary policy; economic fundamental; vector autoregression

## 1. Introduction

Recently, the development of financial inclusion has attracted attention of the whole world. Financial inclusion means that individuals and businesses have access to useful and affordable financial products and services that meet their needs—transactions, payments, savings, credit and insurance—delivered in a responsible and sustainable way (<http://www.worldbank.org/en/topic/financialinclusion/overview>). Many countries are committed to promoting the development of financial inclusion based on their own features and advantages. Malaysia, for instance uses “agent banking”, which is a hallmark initiative that leverages technology to provide financial services to under-served population, particularly in rural areas [1]. The development of financial inclusion is boosted in China, and the Chinese government regards it as a national policy of development with the two financial payment platforms Alipay and WeChat [2]. However, financial exclusion still exists. According to the new report of the World Bank, close to one-third of adults—1.7 billion are still unbanked in our world and about half of unbanked people include women and poor households in rural areas or out of the workforce (<http://www.worldbank.org/en/topic/financialinclusion/overview>). Therefore, financial inclusion urgently needs further development. Meanwhile, the sustainability of financial inclusion deserves more attention. A study on the relationship between financial inclusion and its circumstance will contribute to the sustainable development of financial inclusion. For low-income individuals and regions without sufficient financial resources, inclusive finance plays an important role in income growth and industrial upgrading (Bruhn and Love, 2014) [3].

Referring to the Sustainable Development Goals, the goal of sustainable financial inclusion is to provide financial support to vulnerable groups based on equal opportunities, help them reduce poverty, thereby reducing social inequality and achieving stable economic growth (<https://www.undp.org/content/undp/en/home/sustainable-development-goals.html>). At present, there exists a regional imbalance in the development of China's inclusive finance, and the sustainability of financial inclusion is insufficient (Zhu et al., 2018) [4]. It motivates us to seek the favorable environment to promote the sustainable development of China's financial inclusion. The Global Microscope 2018 on Financial Inclusion released by The Economist Intelligence Unit assessed the enabling environment for financial inclusion in 55 countries and five domains were selected by numbers of experts to define the enabling environment ([https://www.eiu.com/public/topical\\_report.aspx?campaignid=Microscope2018](https://www.eiu.com/public/topical_report.aspx?campaignid=Microscope2018)). It is in line with our research and the 'circumstance' can be regarded as the specific form of the enabling environment. In the critical periods of developing financial inclusion, this paper discusses two important questions. One is what kind of circumstance is suitable for the development of financial inclusion, the other is how to achieve the sustainable development of financial inclusion.

With the interest of people from all over the world, financial inclusion has become a hot topic in academia. The present research can mainly be divided into two categories. One was to discuss on measuring the financial inclusion index or the level of financial inclusion with country level or zone level data (Sarma, 2008; Adalessossi and Kaya, 2015; Ambarkhane et al., 2016; Kumari, 2017; Wang and Guan, 2017) [5–9]; the other was exploring the correlation between financial inclusion and the development of economic factors or society factors (Naceur and Ghazouani, 2007; Sarma and Pais, 2011; Pearce, 2011; Hassan et al., 2011; Allen et al., 2012; Van der Werff et al., 2013; Pradhan et al., 2016; Boukhatem, 2016; Kim et al., 2018) [10–18]. In particular, Kim et al. (2018) studied the correlation between financial inclusion and economic growth in Organization of Islamic Cooperation (OIC) countries [18]. Sarma and Pais (2011) found that levels of human development and financial inclusion in a country move closely with each other [11]. However, few papers have regarded monetary policy and economic fundamental as the external circumstance of financial inclusion and done research on the response of financial inclusion to these circumstance, let alone how to make sure the sustainability of financial inclusion. In this paper, we observe how financial inclusion interacts with economic fundamental and monetary policy by building the vector autoregressive model (VAR) with Chinese regional data. Firstly, we analyse to what extent the external environment-Chinese monetary policy can influence the factors of financial inclusion; Secondly, the financial inclusion factors' dynamic reactions are discussed for the changing of economic situation; Lastly, we obtain some discoveries of the sustainable development of financial inclusion.

The contribution of this paper is shown below. The first is to empirically analyze how the circumstances influence the financial inclusion and how they interact with each other. The second is to recognize the importance of economic and financial coordinating. Namely, while employing inclusive finance to solve the problem of imbalanced economic development, we should avoid the waste of inclusive financial resources caused by overheated economy. The last is to make recommendations of sustainable development of financial inclusion. The remainder of the paper is designed as follows. In Section 2, we give the literature review on financial inclusion. Section 3 presents an analysis of current situation in China. The data description and model are introduced in Section 4. Empirical results and analyses are shown in Section 5. The last section shows the discussion and conclusions.

## 2. Literature Review

The report of the World Bank documented that financial inclusion played an important role in keeping financial stability, mitigating social inequality, reducing poverty and so on. In academia, financial inclusion is a hot topic of study, and there are two main aspects for financial inclusion research. One is measuring the index of financial inclusion with different methods or different data sets. The other is documenting the correlation between financial inclusion and economic factors. Additionally, we try to review the existing literature concerned with the relationship between financial

inclusion and monetary policy. The last part is a review of related studies on the financial inclusion sustainability. The rest of this section will review articles following the aspects above.

In the measurement of financial inclusion aspects, many scholars devoted themselves to improving the reasonability of measurement. Being similar to the method of constructing Human Development index, Sarma (2008) proposed the index of financial index by banking penetration, availability of banking services and usage all three dimensions with 55 countries data [5]. Chakravarty and Pal (2013) proposed an axiomatic approach to analyze the banking financial inclusion and they suggested geographical penetration and credit availability as two policy targets [19]. Cámara and Tuesta (2014) relied on demand and supply-side information to measure the extent of financial inclusion at country level for eighty-two developed and less-developed countries [20]. With Global Findex Database, Adalessossi and Kaya (2015) measured the degree of financial inclusion in the African countries [6]. They found out of the 41 total countries 27 had a low level in financial inclusion whereas 14 had a high level. Kumari (2017) used an empirical study of financial inclusion in urban poor of Kolkata [8] and it revealed that urban poor's financial untouchability prevailed uniformly in all the regions of Kolkata irrespective of the economic development of the region. Except for the regular factors of index, Ambarkhane et al. (2016) considered financial services such as by NBFCs, Insurance Companies, Pension Schemes into the measurement of financial inclusion [7]. Wang and Guan (2017) measured the level of financial inclusion across countries by using the index of financial inclusion and the World Bank Global Findex database [9]. They revealed a geographical spatial aggregation distribution in which developed European and North American countries enjoyed higher levels of financial inclusion than the less developed countries of Africa and most of Asia.

The significance of developing financial inclusion focuses on its effect for the development of our society. Naceur and Ghazouani (2007) revealed that there was no significant relationship between banking and stock market development and growth with an unbalanced panel data from 11 Middle Eastern and North African countries [10]. Sarma and Pais (2011) examined the relationship between financial inclusion and development by empirically identifying country-specific factors that were associated with the level of financial inclusion. It was found that levels of human development and financial inclusion in a country were closely related [11]. The policies targeted to promote inclusion were rather effective among the most excluded (Allen, 2012) [14]. Hassan et al. (2011) provided evidence on the role of financial development in accounting for economic growth in low- and middle-income countries classified by geographic regions [13]. Yu et al. (2012) provided evidence on the role of financial development and stock market development in accounting for economic growth across geographic regions and income groups [21]. Van der Werff et al. (2013) found that social factors were an important part of highly banked populations in a set of thirty-one countries from the OECD [15]. Higher levels of trust in government and formal financial institutions increased the level of financial inclusion. Increases in income inequality were predicted to decrease the banked population within a nation. Allen et al. (2014) employed regression analysis to examine the level and variation of financial development and financial inclusion across Sub-Saharan Africa and the rest of the developing world, relying on some basic determinants and found that population density is considerably more important for financial development and inclusion in Africa than elsewhere [22]. Park and Mercado (2015) constructed a financial inclusion indicator to assess various macroeconomic and country-specific factors affecting the financial inclusion of 37 developing Asian economies. They found that in developing Asia, per capita income, rule of law, and population size increase financial inclusion, while age dependency ratio lowers financial inclusion [23]. Pradhan et al. (2016) investigated the Granger causal relationships between insurance market penetration, broad money, stock-market capitalization, and economic growth, using panel data for the association of south east asian nations regional forum countries for the 1988–2012 period [16]. Boukhatem (2016) identified the channels through which financial development affected poverty. Their results suggested the important contribution of financial development to the reduction of poverty [17]. Kim et al. (2018) examined the relationship between financial inclusion and economic growth in Organization of Islamic Cooperation countries. They

concluded that financial inclusion had a positive effect on the economic growth in Organization of Islamic Cooperation countries [14]. Banerjee et al. (2018) studied the impact of institutional financial inclusion on per capita real GDP growth of selected six South Asian countries [24].

There is limited literature investigating the relationship between financial inclusion and monetary policy, and most of them focus on the monetary policy reaction of the growing financial inclusion. Mbutor and Uba (2013) used annual data from 2005–2014 to examine the impact of financial inclusion on monetary policy effectiveness in Africa and supported the notion that deepening financial inclusion would effectuate monetary policy via working with commercial banks' lending rates with the empirical results [25]. Mehrotra and Yetman (2014) noted that enhancing financial inclusion can somehow cause the declination of output volatility and inflation volatility, which is connected with setting the optimal monetary policy [26]. Evans O. (2016) modeled the the impact of financial inclusion in Africa and found that financial inclusion is not a significant motivation of monetary policy effectiveness while monetary policy effectiveness promotes financial inclusion [27]. Lenka and Bairwa (2016) conducted a study of SAARC countries and it indicated that if the financial accessibility (financial inclusion) increases, it may decrease the inflation rate in an economy, which presents a positive relationship between financial inclusion and monetary policy [28].

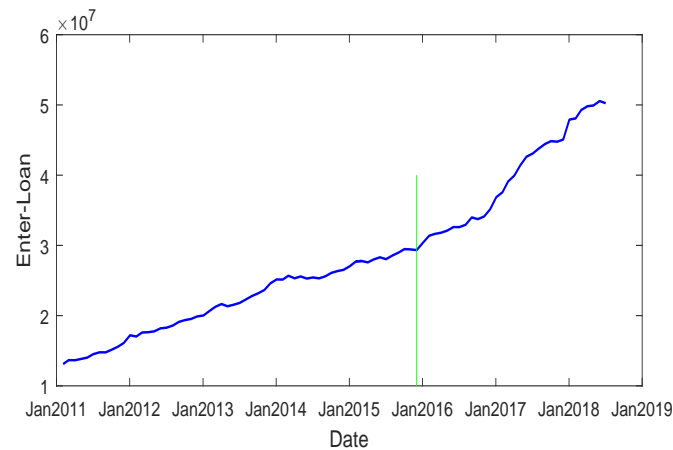
The systematic theoretical framework on the sustainability of financial inclusion development has not established yet. Some researchers propose key factors of financial inclusion sustainability, which can back up our study. Erkut B. (2016a) stated that the competitive advantages can be used to classify countries since the stage of competitiveness is closely related to the effectiveness of governmental institutions [29]. Erkut B. (2016b) conducted a further study which illustrated that the same tendencies existed between entrepreneurship and innovation based on a balanced collection of objective and subjective data [30]. Similar principles apply to the financial inclusion sustainability. A single financial institution ought to be facilitated with more financial inclusion for the entrepreneurial scene and gaining new competitive advantages to maintain its sustainability. Zhu et al. (2018) asserted that it is a good way to evaluate the sustainability by measuring the balance of financial inclusion [4]. Social networks can help informal financial inclusion fully and partially guard against systematic risks from the institutional environment (Chai et al., 2018) [31]. It can be learned that strengthening the effects of social networks may help to promote financial inclusion sustainability.

Though some papers documented the correlation between financial inclusion and economic growth (or poverty, income inequality, etc.), few papers considered the impact of the circumstance on financial inclusion. This paper makes up for the deficiency and discusses the sensibility of financial inclusion to its developing circumstance. Also, we document the importance of economy and finance coordinating.

### 3. Current Situation of Financial Inclusion in China

In recent years, the People's Bank of China has incentivized financial service providers to expand credit services for under-served segments through various policies, including differentiated reserve ratios, loan refinancing, and rediscounted loans and so on. By the end of 2016, the reserve ratio for rural commercial banks registered in county areas was 12 percent, and the reserve ratio for rural cooperative banks, rural credit cooperatives, and village and township banks was 9 percent. These ratios are 5 percentage points and 8 percentage points lower, respectively, than the reserve ratio for large commercial banks. In order to support financial institutions to develop inclusive financial services, the People's Bank of China issued a total of RMB 439 billion (US\$66 billion) in refinancing in 2016, and a total of RMB 381 billion (US\$57 billion) was re-discounted (<http://documents.worldbank.org/curated/en/181081518452447434/>). These monetary policies encourage financial institutions to increase credit supply in specific field by lowering interest rates and loosening borrowing requirements to enable rural areas, the poor, and small and micro enterprises to have access to financial services. Under the implementation of these monetary policies, the agriculture related loans and small and micro enterprise loans have indeed significantly increased in quantity. Since the five-year Plan to

promote financial inclusion was formulated, China has documented many monetary policies related to financial inclusion. In addition, these policies have greatly promoted the development of financial inclusion (Figure 1, there is a large change in green vertical line).



**Figure 1.** The Enter-Loan graph (Unit: 10,000 Yuan). The blue line shows the total amount of Enter-Loan and the green line documents the points that China formulates a Plan to promote financial inclusion development (2016–2020).

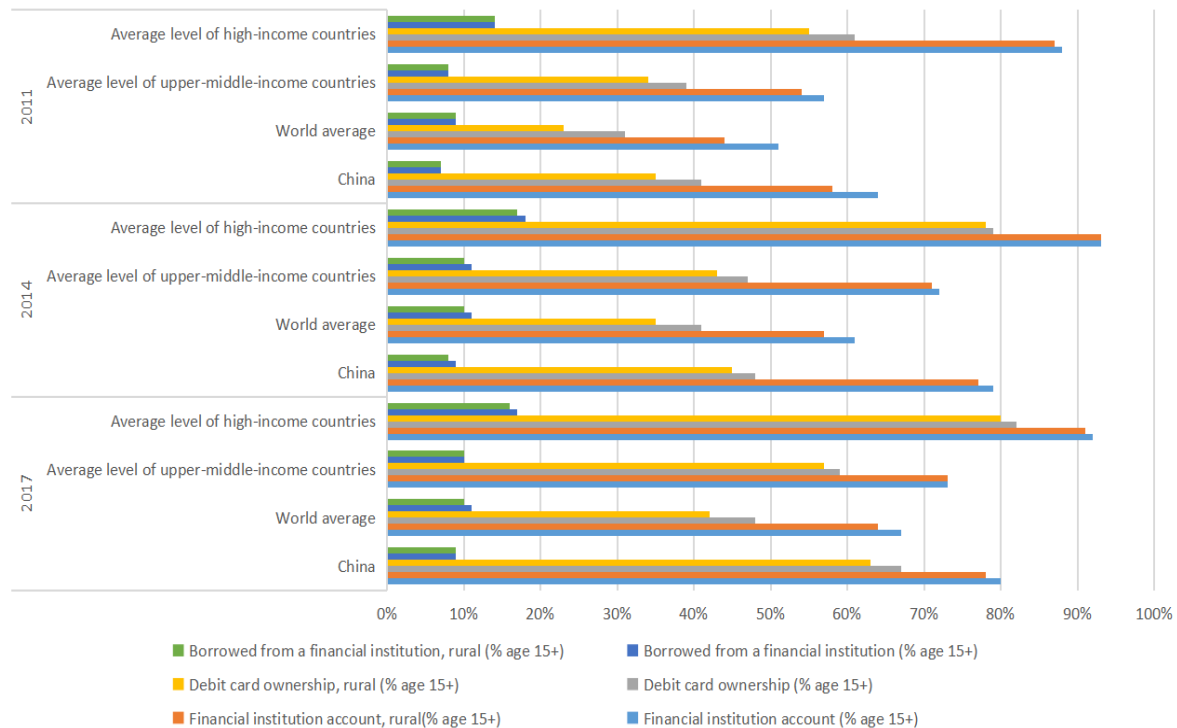
According to the World Bank's Global Findex DataBase in 2011, 2014 and 2017 (<https://globalfindex.worldbank.org/>), the account penetration rate and debit card holding rate of China are always higher than the world average and the average level of upper middle income countries with an upward trend. This reflects a progress in improving the coverage of basic financial services. In terms of credit availability, although the proportion of people who borrowed from financial institutions has achieved steady growth under the implementation of various monetary policies, there is still a certain gap compared with the average level of upper-middle-income countries and even world average. As a matter of fact, financial inclusion has reached a certain level in scale, and its quality and capital efficiency must be taken seriously, which is closely linked to its sustainable development.

Under the downward pressure of GDP growth, China is facing the problem of sustainable economic growth. Although China is the world's second largest economy, the situation of uneven development still exists. It is found that economic disparity exists between regions and provinces in China, and the disparity has a negative impact on economic growth (Lee et al., 2012) [32]. Many low-income people in rural areas are excluded from the growth of the economy while cities and developed areas tend to gather more resources and receive preferential treatment from the financial system. As a result, financial exclusion makes these people fall behind the development of society even more. More attention should be paid to solve the problem of uneven distribution of financial resources to further achieve the sustainable economic development.

China has entered a new economic normality of structural adjustment, regional balanced development and industrial upgrading. Under the macroeconomic background of economic restructuring, it is necessary to solve the financial structural problems so that poor and backward regions can obtain financial resources for industrial upgrading, thereby stimulating the growth potential of the county economy and the agriculture (Peng and Hu, 2018) [33]. Because of that, financial inclusion has been put forward to deal with financial structure optimization and economic sustainable development issues in a way of relocating financial resources and exploiting the developing potential in those less-developed area. As we can see from Figure 2, the level of inclusive financial development in China generally lags behind that in high-income countries, and even lower than the world average in some respects. This shows that China's financial inclusion is insufficient and its role in balancing economic growth is limited. In fact, the Chinese government has actively adopted a broad range of policy measures such as monetary and credit policies, tax policies, and supervision policies to



promote finance to keep pace with economic development. These policies have made great progress, but there is still a long way to go in China for achieving sustainable and long-term financial inclusion because of the existing imbalanced distribution of financial resources.



**Figure 2.** International comparisons of financial inclusion. World Bank's Global Findex DataBase.

## 4. Methodology and Materials

### 4.1. Vector Autoregression Model

This paper aims to empirically examine the impact of the circumstance to financial inclusion by establishing a two-variable VAR model. The traditional econometric method relies only on economic theory to describe the relationship between variables, and cannot provide a strict explanation of their dynamic shock effect. In addition, it also needs to consider modeling the hysteresis function of all endogenous variables for each endogenous variable in the system (Liu and Xia, 2018) [34]. Therefore, it is very complicated to analyze economic problems with time series using traditional econometric methods. The VAR model constructs the model by using each endogenous variable in the system as a function of the hysteresis of all endogenous variables in the system. The model is not based on economic theory and does not distinguish between internal and external variables in advance. In this way, it can effectively control the complexity and difficulty of model estimation and analysis.

The general expression of the VAR model is as follows (Lütkepohl, 2005) [35]:

$$Y_t = B_1 Y_{t-1} + B_2 Y_{t-2} + \cdots + B_p Y_{t-p} + \epsilon_t,$$

where  $Y_t$  is an  $n$ -dimensional variable vector;  $B_t$  is the relevant coefficient matrix to be evaluated;  $p$  and  $t$  are the lag order and time, respectively; and  $\epsilon_t$  is the random disturbance term.

### 4.2. Impulse Response Function

To observe the actions of financial inclusion factors to some changes of circumstance, this study makes the impulse response function (IRF) to characterize and verify correlation between the variables. The IRF expresses the influence of the current and future impact of a standard deviation of random

disturbance terms on all endogenous variables of the model. IRF can clearly and intuitively describe the dynamic reaction process of each endogenous variable to its own change or that of other variables.

IRF is shown as (Hamilton, 1994) [36]:

$$I_Y(n, \delta, \omega_{t-1}) = E[Y_{t+n} | \epsilon_t = \delta, \epsilon_{t+1} = 0, \dots, \epsilon_{t+n} = 0, \omega_{t-1}] \\ - E[Y_{t+n} | \epsilon_t = 0, \epsilon_{t+1} = 0, \dots, \epsilon_{t+n} = 0, \omega_{t-1}].$$

where  $n$  is the impact response period,  $\delta$  refers to the impact from variables,  $\omega_{t-1}$  represents all the available information when an impact occurs,  $I_Y$  is the impulse response value of the  $n$ -th period.

### 4.3. Variable Selection

In general, monetary policy tools can be summarized into two types: price tools and quantity tools. Price tools are mainly through price guidance to play the role of interest corridor, price leverage, stabilization of expectations and financing costs, and then indirectly regulate economic operation. Quantity tools mainly play the role of monetary instruments in regulating the liquidity of the banking system and expanding the aggregate demand through the adjustment of the quantity of money supply, and then directly affect the economic operation (Liu and Xie, 2016) [37]. Many authors selected the Fed Funds rate and money supply (M2) as the proxy variable of price tools and quantity tools, respectively [38–40]. However, there is not a Fed Funds rate in China, the seven-day weighted interbank lending rate (Inter-Lend) is usually selected as proxy variable of price tools. We follow their study and select the Inter-Lend and M2 as the proxy variable of monetary policy. The aim of financial inclusion is to make vulnerable groups to obtain the service of finance. The rural population is about 540 million in China, which is the main service object of financial inclusion. So, we choose the agriculture related loan (Agri-Loan) and agricultural enterprise loan of all financial institutions (Enter-Loan) in Hunan province as the proxy variable of financial inclusion factors (Hunan is a province which lies in the central China). GDP reflects the overall economic strength of the country and is a good proxy variable of economy. Thus, GDP is selected as the proxy variable of economy in this paper. Many scholars have studied the relationship between oil and economy, which found that there was a strong correlation between them [41,42]. To keep the robustness of results, the oil price is selected as another proxy variable of economy. China's economic development is vulnerable to the world oil price fluctuations. We thus choose the crude oil price of West Texas Intermediate (Oil Price) as the proxy variables of the world oil price. The data of interbank lending rate and M2 comes from the People's Bank of China. The financial inclusion factors data gather from Changsha central sub-branch of People's Bank of China. The data of GDP comes from national bureau of statistics in China. WTI is downloaded in U.S. Energy Information Administration.

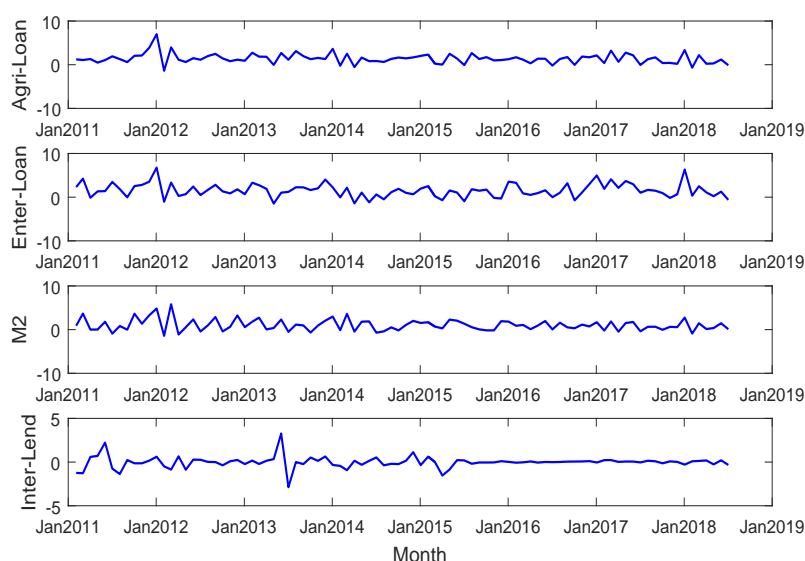
## 5. Empirical Results and Analysis

The purpose of this paper is to document the sensitivity of financial inclusion factor to circumstance-monetary policy and economic fundamental. So we discuss it separately in terms of monetary policy and economic fundamental. All the models are two-dimensional VAR. For data availability, the model on monetary policy and economic fundamental uses monthly data and quarterly data, respectively.

### 5.1. Monetary Policy

#### 5.1.1. Data Processing

We regard all the drawn data normalization and its characteristic of volatility is shown in Figure 3. To avoid the occurrence of pseudo-regression before building VAR model, we need test the stationarity of data by Augmented Dickey-Fuller (ADF) test and the results are described in Table 1.



**Figure 3.** The characteristic of volatility on related variables (Month).

**Table 1.** The results of ADF test (Month).

	Agri-Loan	Enter-Loan	M2	Inter-Lend
Value	−4.56 *** (0.01)	−3.33 * (0.07)	−6.10 *** (0.01)	−7.39 *** (0.01)

The numbers in brackets are *p* value. \*, \*\* and \*\*\* indicate the 10%, 5% and 1% significance level, respectively.

### 5.1.2. Impulse Response Analysis

To figure out the relationship between variables clearly, we document four 2-dimensional VAR models, which are Agri-Loan to M2, Agri-Loan to Inter-Lend, Enter-Loan to M2 and Enter-Loan to Inter-Lend. The optimal lag order of four VAR models is determined by Akaike information criterion and its values are shown in Table 2.

**Table 2.** The optimal lag order.

	Agri-Loan-M2	Agri-Loan-Inter-Lend	Enter-Loan-M2	Enter-Loan-Inter-Lend
Value	2	3	2	4

Figure 4 depicts the impulse response of four VAR models (Here, because we only consider the response of financial inclusion factors to monetary policy in this paper, we give the one-way impulse response.). The four graphs of Figure 4 all show that monetary policy has a short-term positive impact on financial inclusion factors and after a period of fluctuation, they all gradually fade away. The shapes of Figure 4a,c are similar, which shows the price tools of monetary policy are not flexible to the use of fund. Compared with Figure 4b,d, the responses of financial inclusion factors are different faced to shock of the Inter-Lend, and it shows the use of money of financial inclusion are more sensitive to quantity tools of monetary policy. It can be found that either price or quantity tools of monetary policy have a positive effect on financial inclusion. The positive incentives of quantity tools of monetary policy are more capable of promoting the development of financial inclusion compared with price tools.

To sum up, monetary policies produce positive influence on financial inclusion although the effect is limited and differs between quantity and price tools. The policymakers should pay more attention to the effectiveness and sustainability when implementing tools for financial inclusion. Combining quantity tools with price tools could be a more effective and applicable solution under the



background of financial structural adjustment, which provides a sustainable circumstance for financial inclusion growth.

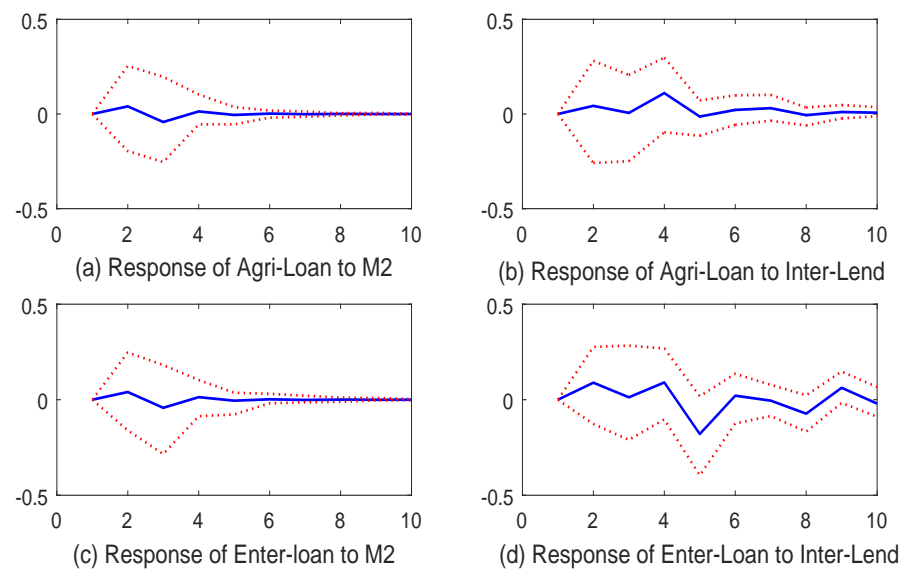


Figure 4. Impulse response graph.

## 5.2. Economic Fundamental

### 5.2.1. Data Processing

Same as above, we regard all the drawn data normalized and its characteristic of volatility is in Figure 5. We use the method of augmented Dickey-Fuller (ADF) test to identify the data stationarity. (There are some differences compared in Section 5.1. For the quarterly data existing obvious seasonality, we need go further difference for normalized data) and the results of ADF test are shown in Table 3.

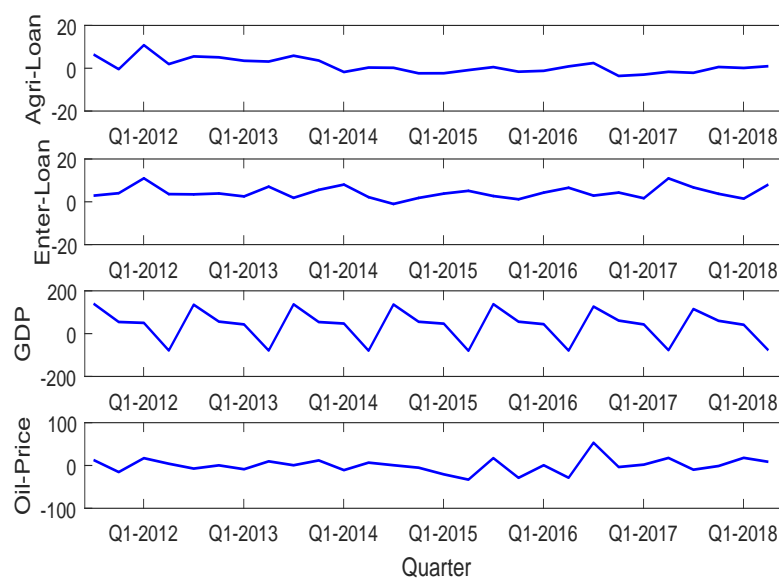


Figure 5. The characteristic of volatility on related variables (Quarter).

**Table 3.** The results of ADF test (Quarter).

	Agri-Loan	Enter-Loan	GDP	Oil Price
Value	−4.93 *** (0.01)	−5.52 * (0.01)	−30.9 *** (0.01)	−5.02 *** (0.01)

The numbers in brackets are *p* value. \*, \*\* and \*\*\* indicate the 10%, 5% and 1% significance level, respectively.

### 5.2.2. Impulse Response Analysis

Similar with monetary policy, we also document four 2-dimensional VAR models, and they are Agri-Loan to GDP, Agri-Loan to Oil Price, Enter-Loan to GDP and Enter-Loan to Oil Price. The optimal lag order of four VAR models is determined by Akaike information criterion and the values are described in Table 4.

**Table 4.** The optimal lag order.

	Agri-Loan-GDP	Agri-Loan-Oil Price	Enter-Loan-GDP	Enter-Loan-Oil Price
Value	3	2	1	2

Figure 6 gives the results of the impulse response of four VAR models. The four graphs of Figure 6 all show that economic fundamental has a short-term negative effect on financial inclusion factors and they all gradually fade away after a period of fluctuation. Specifically, the shapes of Figure 6a,c are similar, which shows the Agri-Loan is not sensitive to the shock of GDP, but the Enter-Loan displays sensitivity faced to the shock of GDP. Compared with Figure 6b,d, the responses of financial inclusion factors are similar faced to shock of the oil price, and it shows the oil prices have an impact on financial inclusion factor. This unexpected negative shock indicates that the financial and economic development of the sample area is not coordinated, and there is no mutual promotion between the two. The empirical results can be analyzed with the present economic and financial situation in China. With the slowdown of China's GDP growth, industrial upgrading and structural adjustment have become a new direction of economic development. Inclusive finance needs to keep up with the pace of the economy by contributing to the industry development and improving the intrinsic capability of the underdeveloped regions, so as to achieve coordinated development with the economy.

The negative effects shown in the empirical results can be divided into two cases. On one hand, since the financial inclusion cannot catch up with the pace of GDP and even suppress its growth in the long term. The government must take forceful measures to allocate the financial resources rationally and promote more fund to the financial inclusion sector, especially in rural and county areas where the financial inclusion should focus on. At the same time, financial inclusion as a specific form of financial liberalization can have a positive cumulative effect on the economy (Peng et al., 2014) [43]. On the other hand, high development of financial inclusion without a good economy is not sustainable. It must make full use of the role of finance in economic development and commit themselves to developing the economy, so that financial resources can be effectively used. In summary, the economy can have a good interaction with the financial inclusion by way of economy and finance coordinating.

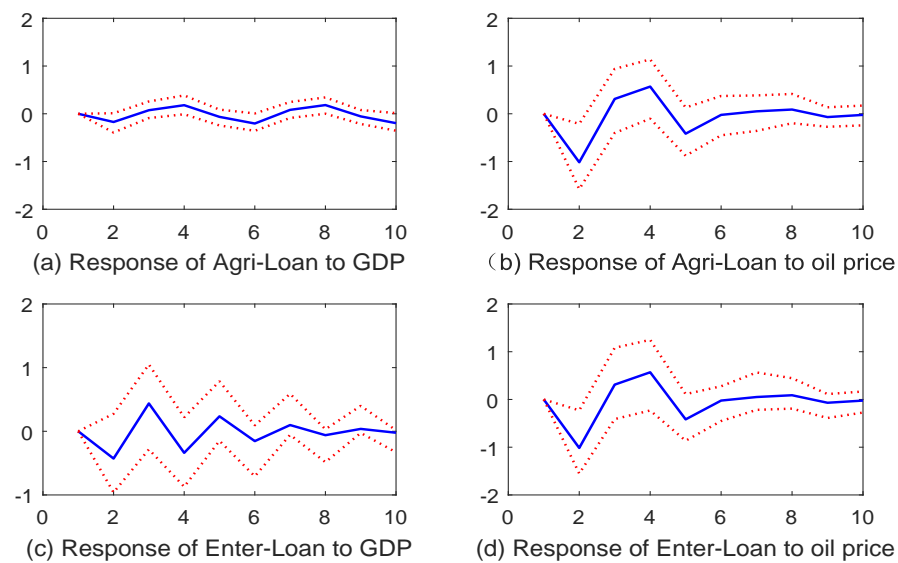


Figure 6. Impulse response graph.

## 6. Discussion and Conclusions

In this paper, we document the behaviors of financial inclusion factors under the impact of their circumstance-monetary policy and economic fundamental. Many countries are advocating for developing financial inclusion, but every country has his own circumstance. Our work has rich policy implications. The policy makers and regulators will be able to adjust the strategy of financial inclusion without delay when noticing the sensitivity of financial inclusion to the circumstances. Therefore, investigating the developing circumstance of financial inclusion is of real value to itself, especially to its sustainability.

Many researchers focused on the measuring the status of financial inclusion, namely measuring financial inclusion index (Sarma, 2008; Adalessossi and Kaya, 2015; Allen et al., 2012, etc.) [5,6,14]. However, accurate measurement of the status financial inclusion is only the first step of studying financial inclusion, and the next step is how to achieve the effective development of financial inclusion and make it sustainable. At the same time, some other researchers study the responses of economic variables or society factors to financial inclusion. However, exploring the behaviors of financial inclusion is of equal importance under the shock of circumstance (Ageme et al., 2018; Lawal et al., 2018; Fontin et al., 2019; Ghosh, 2019; Lashitew et al., 2019) [44–48]. It can provide references for policy making by understanding and further optimizing the circumstance of financial inclusion. Also, the structural similarity among innovation-driven economies- intellectual property legislation, infrastructure and well-functioned government is worth taking into consideration (Erkut B., 2016a) [30]. The structural similarity is in tune with our consideration when it comes to the circumstances of improving the productivity and effectiveness of financial inclusion.

Based on the regional data of China, we established eight VAR models. The first four are for monetary policy, and the last four are for economic fundamental. The empirical results show that the monetary policy exists a positive impact on the factors of financial inclusion and the economy has a contrary one. From the empirical results, it is found that financial inclusion reacts differently in response to the shock of circumstances and we further gain two following discoveries.

Firstly, the sustainable development of financial inclusion needs good circumstances (effective monetary policy). The People's Bank of China has implemented multiple incentive policies which can encourage financial service providers to expand credit to underserved segments. Financial service providers that demonstrate higher outreach to these groups receive better access to these facilities. Therefore, financial institutions have more incentives to provide loans for groups such as farmers,

the poor, and small and micro enterprises. Our empirical results that monetary policy has a positive impact on financial inclusion keep with the monetary policy intentions. A good policy environment is essential to the sustainable development of financial inclusion. Policy makers should introduce incentive monetary policies for inclusive finance and adjust them in a timely manner to maintain the sustainable usefulness of these monetary policies.

Secondly, the economy and finance coordinating is of great importance, which means the mutual promotion of economy and finance. The pursuit of excessive GDP growth is likely to incur structural economic problems, i.e., the imbalance of regional economic development, which will adversely affect the sustainable development of financial inclusion [4]. This imbalance will lead to the polarization of the rich and the poor, and from a financial perspective, it is reflected in the uneven distribution of financial resources. In view of this, the Chinese government is taking a series of measures to eliminate this imbalance, a process known as 'structural reform'. This process requires coordination between finances and the economy. Inclusive finance should serve the balanced development of the economy, especially in rural areas. Furthermore, sustainable inclusive finance will enable vulnerable groups to participate in the process of industrialization, and provide financial support for the transformation and upgrading of underdeveloped regions and local industries.

In the significant transition period of financial inclusion, our research confirms and analyzes the characteristics of this period, and also provides some ideas for the sustainable development of financial inclusion from the environmental aspect. To sum up, the circumstances-incentive monetary policy and economy coordinating with finance are the important prerequisites for the sustainable development of financial inclusion, because the circumstances can promote the quality and capital efficiency of financial inclusion and realize long-term coordinated development of financial inclusion. Then, it can be turned into a virtuous circle, for sustainable financial inclusion will lay a solid foundation for future development. Also, there are a few limitations to our paper. For the data availability we only selected two financial inclusion factors and chose China as the object of study because of data restrictions. So we hope to gather more related data on this topic for further research.

**Author Contributions:** The authors collaborated on all parts of the research including framing of the study collection and analysis of the documents, and writing of the results.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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