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The Coordination Between Macro-Prudential Supervision and Monetary Policy — From the Perspective of Financial Stability

Mengfan Xu[1]

[1] King's College London

Correspondence: Mengfan Xu, King's College London.

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Abstract

The onset of the 2008 economic crisis forced central banks to acknowledge that the monetary policy and micro prudential policy-based financial regulatory framework is insufficient to avert systemic risks. Compared with the low efficiency of micro prudential supervision in preventing and controlling financial systemic risks and the weakness of a single monetary policy tool in controlling financial systemic risks, the current theorists agree that monetary policy and macro prudential supervision policies are effective in coordinating and resisting financial risks. The link with both macro prudential regulation and monetary policy, as well as how to collaborate and coordinate the two policies, are thus major issues that we must address.

Based on this background, this paper systematically combs and analyzes the necessity of coordination between monetary policy and macro prudential policy and the practical experience of relevant research on coordination mode through theoretical research on macro prudential regulation and reference of relevant policies at home and abroad.

This paper uses the literature research method and comparative analysis method to analyze the macro prudential policy and monetary policy in depth. The theoretical basis of macro prudential regulation and monetary policy is formed by classifying, summarizing and sorting out the relevant researches on macro prudential regulation and monetary policy made by scholars from various countries. The implementation of macro prudential policies in developed economies like the United States and the United Kingdom, as well as their monetary policy coordination models, are compared and introduced in this dissertation. It also examines the traits and practical application of macro prudential and monetary policy cooperation in various nations.

Based on the systematic risk theory, micro prudential supervision, macro prudential supervision theory and monetary policy, combined with the current situation of financial regulatory structures in various countries, using the literature research method and comparative analysis, this paper mainly draws the following conclusions: The financial system can only continue to run smoothly under a combined application of macro and micro prudential regulation; Systemic hazards can be efficiently prevented and mitigated by macro prudential oversight methods; Traditional monetary policy is unable to preserve both financial system stability and monetary stability; According to international experience, the central bank's coordination of monetary policy and macro prudential policy can better play the complementary effects of the two programs.

Keywords: monetary policy, financial regulation, macro-prudential policy

1. Introduction

The entire economy and financial system have been severely impacted by the global economic crisis. The industry and academia have been forced to reconsider traditional financial supervision in light of the global economic crisis that was brought on by the risky activity of huge financial institutions. The lessons learned from this crisis make both the academia and the industry think that the traditional financial regulatory framework is

difficult to prevent systemic financial risks across institutions, industries and markets in the financial system. In the past, the "divide and conquer" financial supervision system separated the interconnected financial markets, increased the degree of information asymmetry between financial supervision departments and financial institutions, indirectly indulged the moral hazard of financial institutions' business operations, and further increased the risk of financial crisis. Therefore, maintaining financial stability cannot only focus on the risks of individual financial institutions, but must prevent Suppress systemic financial risks.

The Cook Committee originally proposed the phrase "macro prudence" in a conference that took place in June 1979. At that time, macro prudence was more focused on the theoretical level. The Asian financial crisis in 1997 made people begin to attach importance to the application of macro prudential policies. The international financial regulatory authorities and the academic community have also carried out research on the evaluation of macro prudential indicators, and have made some achievements in practice. The development of the idea of macro prudential supervision was significantly influenced by Crockett's more thorough exposition of the idea in 2000 as senior executive of the Bank for international Settlements. When the global financial crisis first broke out in 2008, it forced the international banking regulatory bodies to take a closer look at the conventional financial regulatory framework, moving macro prudential supervision from a theoretical to practical level of regulation. It also turned the financial regulatory research field's attention to this area of regulation. At the end of 2010, Basel III was introduced, emphasizing the importance of macro prudential policies. It has become the consensus of the global financial regulators that relying only on micro prudential policies can no longer meet the needs of global financial industry supervision. Following the financial crisis in 2008, the implementation of macro prudential policy has gradually evolved into a consistent policy proposal of the financial supervision reform. This is because it is based on the micro prudential supervisory tools, the macro prudential policy seeks to preserve economic stability and avert systematic financial consequences. Due to the financial crisis in 2008, nations all over the world have gradually begun to reform financial supervision and formally incorporated the macro prudential policy into the intended framework of financial supervision policy. After nearly a decade of development, the macro prudential policy has initially formed a relatively complete framework system.

The macro prudential supervision policy will necessarily interact with other policies in order to achieve the objective of financial stability. Theoretically speaking, the combination of the two policy instruments does not always result in the simultaneous accomplishment of the goals of economic stability and price stability due to the obvious pro-cyclical nature of monetary policy and the policy goal of price stability. Therefore, how to coordinate and collaborate between monetary policy and macro prudential policy as well as what their relationship is has become a key concern for financial regulators around the world. The coordination of monetary policy and macro prudential policy has also become the focus of academic attention. The focus of research has also shifted from "whether monetary policy and macro prudential policy can be coordinated" at the beginning of the crisis to "how monetary policy and macro prudential policy should be coordinated". The financial supervision departments of major countries in the world have also formed a macro prudential policy framework led or participated by the central bank, and the coordination between monetary policy and macro prudential policy has also been deepened in practice.

The two primary macroeconomic control policies at the moment are monetary policy and macro prudential policy. The macro prudential policy framework is a recent one. There are currently few studies on the interaction between macro prudential policy and monetary policy, with most studies focusing on the effectiveness of policy tools, mechanisms of action, and policy regulations, etc. Based on the previous research results, this paper further deepens the research on the relationship between the two policies, analyzes the interaction mechanism of the two policies and their coordination methods, which will help enrich the macroeconomic policy coordination theory. Practically speaking, we can only design a macro prudential regulatory structure in a way that appropriately manages the interaction among both monetary policy and macro prudential policy.

The first part of this paper analyzes the basic theoretical issues of macro prudential regulation. First, it introduces the concept of macro prudential regulation, reveals the connotation of macro prudential regulation, compares it with micro prudential regulation, and deeply analyzes its characteristics. Secondly, the policy tools of macro prudential supervision are introduced in detail from the horizontal dimension and time dimension. Finally, through the introduction of systemic risk, it clarifies the basic principle of macro prudential regulation intervention in systemic risk.

The second part is about the experience and enlightenment of foreign macro prudential supervision. Introduce the practice of macro prudential supervision outside the region, such as the construction of the macro prudential supervision framework in the United States, the financial supervision reform in the United Kingdom, the pan European financial supervision reform plan established in Europe, and the time of macro prudential supervision in China.

The third part is the analysis of monetary policy theory. People were driven to re-evaluate the current monetary

policy and highlighted the difficulties that the traditional monetary policy faced as a result of the issues revealed by the financial crisis, such as financial procyclicality and systemic vulnerabilities.

The fourth part analyzes the necessity and feasibility of coordination between monetary policy and macro prudential policy from a theoretical perspective. It combed the time experience of the coordination mode of monetary policy and macro prudential policy, and focused on the specific situation of the coordination mode of monetary policy and macro prudential policy in different countries after the financial crisis.

The fifth part summarizes the conclusion of the full text and points out that the joint efforts of monetary policy and macro prudential supervision are indispensable for maintaining financial stability and macroeconomic stability.

2. Theoretical Analysis of Macro Prudential Regulation

2.1 Definition of Macro Prudential Supervision

2.1.1 Concept of Macro Prudential Supervision

According to conventional micro prudential supervision, the safety and soundness of one individual can guarantee the stability of the global financial system.[1] The entire economy has suffered significant harm as a result of the global financial crisis brought on by the US subprime mortgage crisis, but it has also presented a significant challenge to the traditional idea of micro prudential monitoring. The global financial crisis demonstrates that systemic risks cannot be prevented by using the micro prudential oversight strategy alone.[2] As a result, during the post-crisis financial regulatory reform in several countries, the financial regulatory authorities started to perform "macro prudential supervision" in order to monitor the financial system as a whole instead of just from the standpoint of single finance company.

In fact, the concept of "macro prudence" is not new after the subprime crisis. It can be traced back to the late 1970s. In 1979, the Cook Committee first mentioned "macro prudence" in a conference on the term conversion of international bank loans. This concept, the meeting proposed that it would be difficult to achieve the stability of the entire financial system if only considering the risk monitoring and management of a single financial institution, and proposed that the financial regulatory reform should be carried out from the overall financial system to develop a financial regulatory framework. In October 1979, the Bank of England, in a background document provided to a BIS working organization, pointed out that the micro prudential supervision measures focus on the sound operation of a single financial institution and its protection for depositors, but this supervision method needs to be coordinated with the macro prudential supervision from the perspective of the entire financial system[3]. Subsequently, "macro prudential supervision" gradually appeared in various financial documents, but it was not until the Asian financial crisis broke out that it attracted attention.

At an international conference on banking supervision in 2000, the president of the Bank for International Settlements gave the first definition of "macro prudential supervision" and compared it to "micro prudential supervision". The aim of micro prudential supervision is to safeguard the health and stability of a single financial institution, whereas the purpose of macro prudential supervision is to guarantee the safety of the entire financial system and reduce the likelihood and cost of financial crisis. Therefore, to maintain the stability of the entire financial system, the regulatory authorities must strengthen macro prudential supervision.[4] The following is how macro prudential supervision was characterized by the Bank for International Settlements in 2001: A crucial addition to micro prudential oversight is macro prudential supervision. In order to monitor the risk of the financial system, it monitors not only the riskiness of an individual bank but also the stability of the whole system. The macro prudential supervision has two proposed dimensions: the cross-section dimension and the temporal dimension, according to the economists of the Bank for International Settlements, who also developed a clear distinction between macro prudential supervision and micro prudential supervision in 2003.[5] In 2004, the implementation framework of macro prudential supervision was proposed. [6]Since then, macro prudential regulation has been gradually understood by people.

The global financial crisis that broke out in 2008 has given the international financial community a new understanding of the steady development of the entire financial system. Although some scholars did not support the implementation of macro prudential policy supervision at the beginning of the financial crisis, with the continuous spread of the financial crisis, international financial organizations and national financial regulatory authorities have also strengthened macro regulatory policies. [7]At the G20 London Summit held in 2009, it was clearly pointed out that macro prudential supervision is an important supplement to market integration supervision and micro prudential supervision, and strengthening macro prudential supervision is of great significance for maintaining the stability of the entire financial system. In addition, the new regulatory framework for the financial system was basically established in the Declaration on Strengthening the Financial System issued after the summit. The framework mainly includes: setting up the Financial Stability Board, which is responsible for maintaining financial stability, and rebuilding the Financial Stability Forum; Reform the

financial supervisory frameworks of various nations, educate those jurisdictions' financial watchdogs on the value of macro prudential oversight, and bolster overall financial system oversight; Increasingly broadening the purview of supervision, adding systemically significant financial institutions, financial products, and financial markets to it, as well as including hedge funds for the first time.[8] It can be said that macro prudential regulation has become a hot topic in the discussion of financial regulatory reform among international financial organizations, financial regulatory authorities of various countries and financial academia.

2.1.2 Contents of Macro Prudential Supervision

Macro prudential supervision policy is a kind of regulatory policy that mainly uses prudential tools to prevent systemic risks. [9]Its main objective is to maintain the stability of the financial system and prevent systemic risks. Its main feature is to establish a stronger policy framework that reflects counter cyclical nature. The primary topics covered in this section include bank capital requirements, liquidity requirements, leverage ratio requirements, specific requirements for institutions that are systemically significant, centralized clearing of derivatives transactions, and regulatory measures for shadow banks.[10] We can distinguish the main contents of the macro prudential supervision framework from the two dimensions of time and cross section.[11]

Macro prudential supervision based on time dimension is mainly to assess the accumulation of systematic risk over time. Regulators usually pay high attention to the following areas: the vulnerability of the whole economy caused by the rapid growth of the total amount of credit and the rapid rise of asset prices; The fragility of the industry scope caused by the rapid growth of real estate credit or the increase of the company's industry risk exposure; The fragility of the financial industry caused by the mismatch of foreign exchange terms.[12] In recent years, many researchers are committed to finding different early warning indicators to detect the risks of possible financial crises. Credit to GDP gap data can effectively monitor whether the growth of total credit is too rapid.[13] The growth of real estate mortgage debt and the rise of house price can be used as early warning indicators for the pro-cyclical risk accumulation of the real estate market, and new proxy indicators are constantly proposed in terms of liquidity risk and foreign exchange risk.[14] Because a single indicator often focuses on the risk situation in a single field, and the overall risk warning is not perfect, regulators usually use the multi indicator method, or even combine other micro prudential indicators to measure the vulnerability of the financial system.[15]

By enhancing financial institutions' risk aversion and modifying the pro-cyclical structure of the financial system, a number of macro prudential interventions can avert systemic risks from the temporal dimension. It could be loosely split into tools for credit management, tools for liquidity control, and tools for capital supervision (at both the macro and industrial levels).[16] To increase risk resistance, macro-based capital supervisory techniques (such as a countercyclical capital buffer, dynamic reserve requirements, a time-varying leverage ratio, etc.) are used. In particular, they can preserve a certain level of credit supply during economic downturns and stop the market environment from getting worse. More consideration is given to the lending environment of particular industries for the industry-level capital supervisory tools (like industry capital requirements) in order to increase lenders' risk tolerance. From the perspective of credit restrictions, preventing systemic risks (including LTI, LTV, etc.) primarily entails increasing the borrower's resistance to uncertain factors like changes in asset prices and income in order to increase the lender's possibility to indirectly prevent risks. In order to prevent the development of market liquidity risk liquidity-based macro prudential instruments (such as Liquidity Coverage Ratio and Net Steady Finance Ratio established in Basel III Regulation) provide market liquidity support through the supervision of liquidity assets.

Macro prudential supervision based on cross sectional dimensions pays more attention to the correlation between financial intermediaries and market infrastructure in the financial system, as well as the impact on the entire financial system and even the real economy caused by the crisis of these institutions.[17] At present, in order to better prevent the contagion and diffusion of systemic risks among major financial institutions from the cross sectional dimension, international regulatory organizations are mainly engaged in preventing systemic risks from three aspects: before, during and after the event.[18] In the pre-prevention stage, the supervisor fundamentally prevents an institution from being at the center of the whole industry by strengthening the recognition of the systemic importance of financial institutions. BCBS has monitored G-SIBs since 2011, and the International Association of Insurance Supervisors has also regularly disclosed G-SIBs. In addition, the regulatory framework for shadow banks, over-the-counter derivatives markets and non-banking institutions is also in the process of continuous improvement. In the avoidance stage, macro prudential supervision mainly improves the loss absorption capacity of financial institutions in a systemically important position by strengthening their regulatory requirements to minimize the possibility of their failure. This is mainly reflected in the additional capital requirements for systemically important financial institutions, increasing the liquidity coverage ratio, limiting the exposure to large risks, and introducing regulatory standards for leverage ratio. The ex-post disposal stage refers to the adoption of appropriate disposal methods to avoid serious systemic risks and protect investors by establishing an effective institutional framework for disposal. We will improve the resolution system and

resolution tools, establish a cross-border resolution coordination mechanism, formulate recovery and resolution plans, and establish a deposit insurance system.

2.1.3 The Relationship Between Macro Prudential Supervision and Micro Prudential Supervision

As a new type of supervision mode, macro prudential supervision is different from micro prudential supervision which focuses on the situation of a single financial institution. Macro prudential supervision pays more attention to the systemic risk of the entire financial system. It usually regards many financial institutions as a whole to prevent the chain reaction between financial institutions from impacting the entire financial system[19]. The differences between macro prudential supervision and micro prudential supervision are mainly shown in the following aspects.

First, the regulatory objectives are different. The goal of micro prudential supervision is to protect financial consumers and maintain the stability of individual financial institutions; [20]The goal of macro prudential supervision is to maintain the stability of the entire financial system and prevent the adverse effects of systematic financial risks on the macro-economy.[21]

Second, the regulatory concerns are different. Micro prudential supervision mainly considers the risk of a single financial institution, and believes that this risk is an endogenous risk in the market, while macro prudential supervision mainly focuses on the common risk of the whole financial system, which is a systemic risk caused by the correlation between financial institutions, and believes that this risk is an exogenous risk.

Third, the ways of supervision are different. Micro prudential supervision is a bottom-up supervision from individual to whole. This supervision method designs supervision standards for the risk situation of a single financial institution, but ignores the connection between a single financial institution and the whole financial system. The macro prudential supervision is a top-down supervision. It first measures the risk losses of the entire financial system, then judges the different impacts on the system security according to the size, operation, business relevance and other factors of a single financial institution, and finally sets relevant policies and makes timely adjustments according to the actual situation.

Fourth, the focus of policy tools is different. The common policy tool of micro prudential supervision is to propose capital requirements and establish corresponding accounting rules, and conduct risk monitoring from the market transactions and customer management of financial institutions to obtain risk management data, so as to improve the security of individual financial institutions. While the policy tools used by macro prudential supervision also include capital requirements, liquidity risk indicators, loan loss reserves, etc., the focus of the policy tools used is the business cycle and systemic risks of the financial system. From these perspectives, it conducts data collection and sorting, stress testing, early warning system and other global analysis, and then sets specific regulatory indicators.[22]

While there are many differences between macro prudential supervision and micro prudential supervision, there are also links between macro prudential supervision and micro prudential supervision. For example, the risks that macro prudential supervision focuses on mainly come from the micro activities of the financial market, the risk carriers are mainly micro entities, the risk monitoring also depends on the micro market data, and the supervision tools are mainly applicable to micro entities.[23]

In other words, rather than being in contradiction, macro prudential supervision and micro prudential supervision are two different approaches to financial supervision. In the same way as macro prudential supervision offers a systematic and thorough guarantee for micro prudential supervision, micro prudential supervision serves as a strong foundation for macro prudential supervision. We must actualize the organic combination of macro prudential supervision and micro prudential supervision in order to efficiently eliminate systemic financial risks and safeguard the stability of the whole financial system.[24]

2.2 Tools for Macro Prudential Supervision

2.2.1 Time Dimension

Risk usually accumulates in the period of credit expansion and appears in the period of credit contraction. The core of macro prudential policy is to calibrate prudential tools so that buffers (such as capital, provisions, etc.) can be accumulated in the upward period of the economy and can be used in the downward period of the economy, playing the role of “making up the deficit with the abundance”. The main factors affecting the buffer are the overall risk bearing status and credit status of the financial system, which are not different from the risk status of individual institutions. This countercyclical institutional arrangement is not only conducive to limiting the risk accumulation in the expansion period in advance, and better absorbing the losses in the crisis period afterwards, but also conducive to encouraging the risk bearing and lending behavior in the downward period to support economic activities, thus reducing the volatility of the economic and financial cycle.[25] Specific measures are as follows.

2.2.1.1 Countercyclical Capital Buffer System

Anti-cyclical capital regulatory requirements can be set at the overall capital level. Under the first pillar, correct the excessive pro-cyclicality of the minimum capital requirements of the New Accord. The input and output parameters of the smoothing capital calculation formula, such as strengthening the adoption of the cross-cycle rating method, and introducing the pressure parameter of the probability of default, can greatly reduce its pro cycle sensitivity. [26]We can also increase countercyclical additional capital under the second pillar. The regulatory authorities should adjust capital requirements in a pro-cyclical manner, increase capital requirements in the economic upturn period, increase the marginal cost of lending, and provide incentives to reduce excessive lending; Reduce capital requirements during the economic downturn to meet normal credit demand.[27] The mainstream approach is to adopt the countercyclical multiplier, that is, to determine the countercyclical multiplier according to macroeconomic conditions and adjust the minimum capital requirements calculated according to the new agreement. Two capital multipliers can be used. The first multiplier is related to the average credit growth and leverage, and the second multiplier is related to the maturity mismatch of assets and liabilities. The balance sheet can not truly reflect the risk status of the bank, so the countercyclical capital multiplier should be linked with the growth of the bank's asset value to ease the pro-cyclical nature of the fair value and VaR model and curb the excessive growth of credit.[28] As economic overheating often originates from specific sectors, countercyclical excess capital can also be set at the level of capital decomposition. If the risk exposure of a specific department can be set, it is equivalent to changing the risk weight of such assets and increasing the marginal cost of lending to overheated sectors.[29]

2.2.1.2 Prospective Provision System

During the period of credit expansion, banks should make more preparations. On the one hand, they can restrain the motivation of lending in advance, and on the other hand, they can offset credit losses afterwards. The dynamic provision system implemented by the Spanish regulatory authorities is to add countercyclical general provisions to the special provisions as a buffer. [30]The special provision is natural pro-cyclical for the withdrawal of loans with signs of loss; General provisions are used to identify potential losses. They are countercyclical and can smooth the provision for the whole cycle. The sum of the two is the total provision, equal to long-term historical loss. At the peak of the credit expansion period, buffer reserves equivalent to 2%~3% of risk weighted assets can be increased as part of or independent of regulatory capital.[31]

2.2.1.3 Regulation of Liquidity and Maturity Mismatch

Correcting the maturity mismatch of financing is conducive to reducing the accumulation and spread of time dimension systematic risk, and there are two ways to consider. First, increase liquidity capital requirements. In view of the low liquidity risk pricing in the boom period, formulating additional liquidity capital requirements can not only provide liquidity insurance for the financial system, but also encourage banks to improve the term structure matching of assets and liabilities.[32] You can also design an indicator to calculate the maturity mismatch of banks, and adjust the liquidity capital requirements of banks over time according to this indicator. [33]Second, the valuation method of mark to financing is adopted. There are two kinds of prices to choose from, namely, today's market value and the discounted value of future cash flows, when market pegged financing is adopted as a supplement to market pegged financing. Financial institutions with short-term sources of funds shall apply the former and those with long-term sources of funds shall apply the latter. [34]In this way, the discounted present value of future cash flow will be used as the basis for financing valuation, which will stimulate the bank's long-term financing channels, so as to relieve the liquidity pressure when the crisis occurs.[35]

2.2.1.4 Limiting Excessive Credit Growth Through Leverage

First, dynamically adjust the leverage ratio of financial transactions. These measures can affect both credit demand and credit supply. According to the macroeconomic imbalance, the maximum loan to value ratio and loan to income ratio are dynamically adjusted to affect the demand for real estate mortgage loans. LTV and LTI are micro prudential tools, and if they are used dynamically, they are macro prudential tools. When the credit increase is excessive, tighten these measures, and when the real estate market declines, relax accordingly. For guaranteed financial transactions between banks and non-bank financial institutions, set a discount rate that changes over time, which will affect the marginal cost of banks' loans to non-bank institutions (such as shadow banks) in the case of overheated economy, and curb the non-prudential increase of the leverage ratio of non-bank institutions. Second, introduce leverage ratio of capital structure. The introduction of gross leverage ratio (the ratio of capital to unadjusted assets) and the setting of a "one size fits all" upper limit for all banks can remedy the defects of the internal model of the New Capital Accord, prevent the excessive expansion of financial institutions' assets and liabilities, and control the continuous accumulation of systemic risks. In addition, dynamic leverage can also be introduced to overcome the pro-cyclical problem of leverage itself.

2.2.2 Spatial Dimension

The systemically important financial institutions, markets and instruments have increased the relevance of the financial system and the systemic risk in the spatial dimension. The core of the macro prudential policy is to calibrate the prudential supervision tools according to the system importance and provide additional incentives for financial institutions to internalize the spillover costs. Specifically, regulators can adopt a top-down approach to measure the tail risk of the system, and then calculate the marginal contribution of a single financial institution (instrument) to the systemic risk, so as to adjust the regulatory tools and implement differentiated regulatory standards. The difficulty of spatial dimension lies in how to identify systemically important institutions and how to calibrate additional capital.

2.2.2.1 Supervision of Systemically Important Financial Institutions

SIFIs have a relatively high contribution to systemic risk, so they should accept the regulatory requirements matching their systemic risk level. Two goals need to be achieved: reducing the systemic relevance of SIFIs and reducing the probability of SIFIs bankruptcy. The first goal can be achieved by isolating business activities. The "Volcker Rule" proposed by the US government focuses on restricting bank proprietary trading and investment in private equity funds and hedge funds. Isolate core payment activities and proprietary transactions from other banking businesses to limit the infectivity of key banking businesses during the crisis. [36]The second objective can be achieved through additional prudential requirements.[37] First, according to the contribution of financial institutions to systematic risk, an additional capital requirement corresponding to their systematic position is added. In this way, it can not only provide insurance for the entire financial system, but also encourage individual financial institutions to limit system wide losses. The second is to increase additional liquidity capital requirements for SIFIs, provide insurance for the liquidity of key lenders in the inter-bank market, make them more resilient to liquidity shocks, and reduce the possibility of liquidity pooling. Third, considering the different systemic importance of different types of financial institutions, we can distinguish which macro prudential supervision is applicable to the types of financial institutions. [38]One idea is to divide financial institutions into four categories according to their system importance based on the measurement of risk spillover effect, and apply different supervision methods respectively. Macro prudential supervision should also be carried out for institutions that are not individually important but are systemically important. Another idea is to raise capital requirements for financial institutions similar to other institutions, and set lower capital requirements for financial institutions with higher degree of specialization to encourage the diversity of the financial system.[39] The fourth is the issuance of contingent debt instruments (Co Cos). When the capital adequacy ratio is lower than a certain threshold, contingent debt instruments are automatically converted into equity instruments. As banks only hold additional capital under specific circumstances, the cost is relatively low.[40]

2.2.2.2 Regulation of Systemically Important Instruments

The innovation of some financial instruments has increased the relevance between financial institutions and made the financial network more complex. It is necessary to implement stricter supervision and put forward higher capital requirements. A list of systemically important instruments can be established according to the trading volume, the relationship with leverage ratio and the correlation, and the registration, exchange trading and central settlement systems can be implemented for these instruments to reduce the risk transmissibility of these instruments.[41] Concentration risk will also increase the degree of correlation between financial institutions, and it is necessary to strengthen supervision over the joint exposure of different institutions. For example, on the asset side, impose stricter restrictions on interbank market exposure or loans to a certain sector (such as real estate); Or on the debtor side, increase capital requirements for institutions with a high proportion of wholesale capital sources.

2.2.2.3 Insurance System of Financial Institutions

When a crisis strikes, the deposit insurance system seems to be the last line of defense for the public interest, which is crucial for preserving both social and financial stability. 165 economic institutions in the United States failed during the financial crisis, although there was no widespread public run due to the successful rescue of insurance companies. Buying capital insurance is better than increasing capital. [42]After buying capital insurance, banks will be paid when the whole banking sector is in crisis, so that banks can get more capital when total capital is scarce. [43]The regulatory authorities may require banks to purchase insurance from the private sector to deal with possible losses in the event of financial crisis, and then the insurance company's compensation will be injected into the government education fund.[44] In this way, the market mechanism can be introduced to discover the price of systematic risk, and it is also helpful to curb the moral hazard of banks. Each bank pays a liquidity insurance premium to the regulator. Liquidity premium is mainly determined according to the size of its liabilities in short-term wholesale financing, and the term is weighted.[45]

2.2.2.4 Systematic Tax System

Taxation will not weaken the competitiveness of banks and directly affect the net profits of banks, which can

well avoid the shortcomings of capital increase. Banks can levy taxes based on systematic risk contributions, create a systematic fund, and adopt practices similar to those of the Federal Deposit Insurance Corporation, which will help reduce the incentive for financial institutions to become "too big to fail" institutions.[46] A "contribution tax on financial stability" is levied on global banks and financial institutions, and bank liabilities other than equity and insured deposits are taxed. The tax has accumulated into a rescue fund, which is mainly used to pay for future rescue costs to banks and financial institutions.[47]

2.3 Macro Prudential Supervision and Systemic Risk

2.3.1 Meaning of Systematic Risk

After the financial collapse broke out in 2008 theoretical research and regulatory bodies turned their attention to systemic financial risk, which had been studied since the 1980s. Based on the complexity of systemic financial risk, the theoretical circle has not yet formed a unified definition of the category of systemic financial risk. Different organizations and scholars have made different definitions based on different perspectives, which can be summarized into the following four categories: First, the definition based on the scope of systemic financial risk hazards. An occurrence that puts the safety of the whole financial system and macroeconomic system at risk is known as a systemic financial risk. [48]The second is based on the definition of risk contagion. This definition emphasizes that a series of systematic events or events that will affect the public's confidence[49] in the entire financial system will continue to transmit and expand through the associated structure of the economy and financial system, and eventually lead to the paralysis of the entire financial system. [50]The third is based on the definition of financial market functions. Systemic financial risks will lead to the interruption of financial market information, disrupt the order of market operation, and lead to the loss of financial regulation function.[51] The fourth is based on the definition of the impact on the real economy. Systemic financial risk refers to the risk that a large range of financial services are interrupted when the financial system suffers losses in part or in whole, thus causing serious impact on the real economy.[52]

2.3.2 Characteristics of Systematic Risk

First, systematic risks are widespread and universal. A few banking institutions will have a chain reaction when they are in danger or under the impact of macro-economy, so that the crisis can spread rapidly through the banking system.[53] Second, systematic risk has obvious negative externalities. Systematic risk of banking industry is a "negative externality", because the cost imposed on the whole society by a single bank financial institution in distress or failure is higher than its actual value, and the scope of systemic risk is not limited to the economic and financial fields of a country.[54] Third, systematic risks are extremely infectious. The problems of one country's banks will cause other healthy banks to default, paralyze and close down. For example, the US subprime crisis in 2007 and the world financial crisis in 2008 are both highly infectious systemic crises. There are many infectious channels for systemic risks, and financial globalization and liberalization are the most important ones. In recent years, the proliferation of financial derivatives and deregulation have covered up potential risks and accumulated huge systemic risks.[55] Fourth, systematic risk has the asymmetry of risk and return. Banking institutions gain income through the monetary system and capital market mechanism, and transfer or pass on risks, thus splitting the symmetry between risk and income, resulting in an imbalance between risk bearing and income sharing. Although the occurrence of systematic risk can be "corrected" to a certain extent, it is particularly harmful, which may lead to the risk of "domino" collapse in the entire financial system, leading to the net loss of national wealth, and a huge blow to market confidence, thus making the relationship between the return and risk of banking systematic risk unbalanced. Fifth, the systematic risk has long-term concealment and accumulation. The bank credit loss may be covered by the bank credit cycle, and the false prosperity of the capital market and the real estate market caused by the inconsistency between the expansion of the virtual economy and the real economy also covers up the systemic risk of the banking industry. Although concealment can provide some buffering and compensating opportunities for banks in the short term, it may bring serious systemic risks or systemic crises to the banking industry.

2.3.3 Basic Principles of Macro Prudential Regulation Intervention on Systemic Risk

2.3.3.1 Avoid "Herd Effect"

A single financial institution is unstable and vulnerable. In the case of asymmetric information, market participants have herd behavior, that is, "herd effect".[56] When investing, market participants evaluate the risk of investment business through the information they have obtained. Once they think that the investment decisions they have adopted will cause losses to investors, they will withdraw from such investment business quickly. When people see other people taking certain actions to avoid risks, they will do the same. Bank runs and bankruptcies occur under the influence of "herd effect", when this run is transferred from one bank to multiple banks, the whole banking system will face systematic risk. This also shows that the traditional micro prudential supervision has its limitations.[57] The micro prudential supervision of a single institution cannot reasonably

control the systematic risks under the influence of many factors. The formation of risks is not a simple addition of risks among individual institutions. When the overflow risk generated by the bankruptcy of a financial institution will affect the entire financial system, this is a problem that the micro prudential supervision cannot deal with. Different is the idea of macro prudential regulation. It is an all-encompassing financial system top-down supervisory model. Macro prudential supervision can effectively respond and build more effective and accurate response techniques when the financial system faces negative impacts and risks. Compared with micro prudential supervision, it is more systematic and efficient.[58]

2.3.3.2 Restrain Financial Procyclicality

There are certain rules in the operation of the financial system. Its pro-cyclical characteristics are closely related to changes in the real economy, and its impact mechanism has a positive feedback. For the financial market, when the economy is depressed and asset prices fall, the information of market participants is asymmetric, and investors cannot determine the risk of investment projects, causing the borrower to be unable to obtain funds to carry out projects, leading to further deterioration of the economic situation; In a period of good economic conditions, the possibility of investment profits increases, the overall market is favourable, asset prices are growing rapidly, and borrowers can easily obtain funds, which will lead to further economic growth and overheating. For financial institutions, affected by the macro-economy, the loan default rate of financial institutions also has a pro-cyclical feature, that is, in the economic upturn period, financial institutions are willing to take more risks, credit expansion, and the loan default rate decreases, while in the economic downturn period, financial institutions tend to take less risks, credit contraction, and the loan default rate increases. This pro-cyclical feature will promote and expand economic fluctuations and oscillations, increase the instability and cyclical risks of the real economy, which may lead to systemic risks.[59] Countercyclical supervision, a key component of macro prudential supervision, significantly reduces the financial system's intrinsic procyclicality.[60] In the circumstance of an economic imbalance, countercyclical regulation in macro prudent supervision ensures that the financial system does not fluctuate significantly over time, controls risks associated with economic fluctuations, and accrues countercyclical capital buffers to lessen the impact of shocks on the real economy, preventing the occurrence of systemic risks.

2.3.3.3 Avoid "Too Big to Fail"

The supervision theory of "too big to fail" holds that there are similar financial institutions within the financial system, which play an important role in the stability of its financial system. Once it fails, it will bring huge risks to the financial system and even the entire economic system. It must maintain stable operation. [61]When a crisis occurs, the government or the central bank must implement rescue measures. The advantage of the "too big to fail" system is that when a crisis occurs, it can protect and rescue large banks and avoid the spread of systemic risks. However, as the government or central bank will certainly take measures when risks arise, large banks will not take any measures. The "too big to fail" system has become a risk barrier for large banks, making them more motivated to conduct risky business, leading to the occurrence of moral hazard, encouraging such institutions to conduct high-risk financial operations, and intensifying the destructive effect of systematic shocks. The macro prudential supervision is based on the supervision of the entire economic system, maintaining the stability of the real economy from the macro level, implementing higher capital and liquidity standards for its important financial institutions, reducing the possibility of obtaining risks caused by "too big to fail" problems, so as to prevent systemic risks.

3. Macro Prudential Supervision Practices in Various Countries

3.1 The United States

The Dodd Frank Wall Street Reform and Consumer Protection Act was passed by the US Congress in 2010.[62] It called for the creation of a new regulatory coordination mechanism, the modification of the original "double bull" financial supervision system, and the creation of a financial stability supervision committee with the Federal Reserve, the Ministry of Finance, and other significant federal regulators to identify and prevent systemic risks.[63] The bill also clarifies the central position of the Federal Reserve in macro prudential supervision, endows the Federal Reserve with the responsibility of being a "systemic risk regulator" and the power to maintain financial stability. Through this reform, the Federal Reserve has achieved a leap from the central bank to the "super police of financial supervision" and become the main macro prudential supervision department in the United States. In this bill, the US government clearly proposed to establish a macro prudential regulatory framework to effectively prevent systemic risks, with the specific contents as follows.

3.1.1 Supervision of "Systemically Important" Financial Institutions by the Central Bank

The US subprime crisis shows that large financial institutions with systemic importance must become the focus of US regulators. Its business scope covers a large area of cross industry and cross region in the horizontal direction, and has extensive network institutional coverage in the vertical direction. With the occurrence of risks,

it will quickly affect the entire financial market, causing severe turbulence in the financial system. The Dodd Frank Act clearly gives the Federal Reserve the direct power to supervise systemically important financial institutions, expanding its scope of supervision to "any financial enterprise that may pose a threat to financial stability".

3.1.2 Creation of the Financial Services Regulatory Commission

An important manifestation of the lack of macro prudential concept in the U.S. financial regulatory framework is the vicious competition among multiple regulatory bodies in its original regulatory system. In view of this defect, it is undoubtedly necessary to strengthen coordination among various financial authorities. The Dodd Frank Act proposes to establish a financial services regulatory committee to promote coordination among various regulatory agencies, which is composed of the Federal Housing Finance Administration, the Commodity Futures Trading Commission, the Securities and Exchange Commission, and other financial regulatory agencies, and is headed by the Ministry of Finance. The Act stipulates that FSOC specifically implements the formulation of regulatory standards, coordination of regulatory conflicts and settlement of regulatory disputes. FSOC is authorized to obtain the relevant risk information of any financial institution, and has the obligation to give risk warnings to various regulators according to the risk information, and require the regulators to make appropriate responses to the warnings. At the same time, in order to avoid the excessive expansion of the Federal Reserve's regulatory power, the bill stipulates that the FSOC will supervise the Federal Reserve. The FSOC will first determine the scope of systemically important financial institutions. The Federal Reserve can exercise its regulatory function on systemically important financial institutions only after obtaining the written permission of the Ministry of Finance through the FSOC. As a result, a framework of checks and balances between regulators has also been formed.

3.1.3 Comprehensive Coverage Supervision

All financial derivatives trading activities are subject to standardized management. All financial operations must be centralized and cleared in a regulated legal trading place in real time. All transaction records must be archived for immediate inspection. The SEC is required to register the private information of all hedge fund managers. All financial institutions are required to pay the legal limit of trading capital in full when conducting OTC securities trading, and their trading positions will be subject to higher restrictions when trading various financial products.

3.2 England

3.2.1 Establishment of a New Macro Prudential Supervision Institution

The British Parliament passed the Banking Act 2009,[64] which clarifies the leading position and responsibilities of the Bank of England as the central bank of the United Kingdom in maintaining financial stability, and strengthens its financial supervision functions. In addition, the bill also proposes to establish the FSC, whose main responsibility is to detect and respond to possible systemic risks in the financial system. In 2009, British Minister of the Treasury Darling released a white paper entitled "Reforming the Financial Market", which proposed to establish a financial regulatory agency dedicated to identifying and preventing systemic risks and named it the CFS, which is composed of the Bank of England, the Ministry of Finance and the Financial Services Authority of the United Kingdom, and is chaired by the Minister of Finance. The overall responsibility of CFS is to analyze and investigate the risk factors that affect the stability of the UK financial system, and assist the financial regulatory authorities to take corresponding regulatory measures.

3.2.2 Pro-Cyclical Regulation of Systemically Important Financial Institutions and Financial Systems

In the new financial regulatory reform plan in Britain, the financial regulatory authority sets different regulatory plans according to two different dimensions, namely, cross industry dimension and cross time dimension. However, this series of financial regulatory reform programs did not seem to achieve the desired results. The UK Ministry of Finance thus unveiled a new proposal for financial regulatory reform in June 2010 and suggested that the country create a system of financial regulation that would be jointly overseen by the Financial Services Authority, the Ministry of Finance, and the Bank of England. The Financial Services Authority should also become a subsidiary of the Bank of England and fall under its authority. The Bank of England should also be in charge of its financial supervision duties. The Prudential Regulation Authority and the Financial Policy Committee should also be established by the Bank of England. While the latter is in charge of prudential oversight of commercial banks, investment banks, insurance firms, and other financial institutions, the former is in charge of formulating monetary policy. With this reform, the Bank of England's fundamental role in the system of financial supervision has been more precisely defined. It has also been demonstrated that the Bank of England will faithfully carry out its role as the primary macro prudential supervisor in order to preserve the security of the entire financial system.

3.3 EU

The EU has re-established the “three bureaus for one” system to strengthen financial supervision and risk prevention at the EU-wide level. In terms of macro supervision, the European Systemic Risk Board has been set up to monitor possible macro risks in financial markets across the EU, issue timely warnings and, if necessary, recommend measures to be taken. The governors of the central banks in the member states of the European Union make up its membership. In order to micro regulate the financial industry, the European System of Financial Supervisors was established. It consists of three supervisory agencies for the financial industry: the European Securities and Markets Agency, the European Insurance and Occupational Pensions Agency, and the European Banking Agency. Together, the ESRB and the ESFS provide the overarching framework of financial supervision based on the integration of macro and micro prudential, and they also serve as a point of reference for the financial regulation of the entire European Union.

The ESRB is based on the macro prudential level of financial supervision. Its main functions include: establishing a macroeconomic analysis platform, monitoring market fluctuations in real time and assessing uncertainties that may affect economic and financial developments; Specific identification and identification of systemic risks within the EU system, with a focus on the links between micro financial entities and systemic risks; Give early warning of risks in a timely manner, urge macro-financial supervisory authorities and micro-financial supervisory authorities of the EU system to take necessary measures to defuse risks, and establish a mechanism of contact with each other; When systemic risks emerge, China will interact with international economic and financial organizations in a timely manner, take proactive measures, and strengthen regulatory cooperation.

The ESFS mainly conducts prudential-financial supervision in the micro field. The ESFS is committed to strengthening the coordination of supervision rules among member States, developing unified supervision standards, and improving the overall ability of pan-European countries to withstand systemic risks. In the financial system with aspects of macro, micro prudent supervision, ESFS is mainly responsible for the micro financial institutions in all aspects of information acquisition, would be likely to lead to various risks and fluctuations in financial instability situation report to the ESRB regulation, the latter by inside the economic system of euro next macroeconomic judge again, specific screening and determination of the existence and strength of systemic risks, and through the information channel of the ESFS to timely issue risk warnings to the corresponding countries and organizations, risk intervention. From the perspective of the financial reform bills of major European and American countries, the financial supervision functions of central banks have been generally strengthened, and the coordination and unification of financial supervision and monetary policy functions have been emphasized.[65]

3.4 Experience and Enlightenment

3.4.1 The Overall Planning Role of the Central Bank

Judging from the direction of financial reform in the United States, Britain and other developed countries in recent years, they have expanded the regulatory authority of the central bank. The United States has strengthened the position and role of the Federal Reserve in the financial supervision system, making it a “super regulator” in a certain sense. After the reform, the Bank of England integrated price supervision and macro prudential supervision. Although the institutional settings of EU monetary policy and macro prudential policy decision-making are separated, the ESRB is attached to the European Central Bank, which will also assist the ESRB in collecting and analyzing information related to systemic risks. From the practice of these countries, it is impossible to separate financial supervision from the central bank. Without the central bank’s overall planning, only relying on the coordination mechanism can not effectively prevent financial risks.

3.4.2 Establish a Cross Sectoral Regulatory Coordination Agency

In order to strengthen the coordination between regulators, the United States has established a higher level cross sectoral regulatory coordination agency, namely FSOC. Although the current FPC in the UK is a committee set up under the Bank of England, it also reflects the cross sectoral characteristics. Its members are not only from within the Bank of England, but also from the FCA, the Ministry of Finance and other departments. The members of the EU ESRB Steering Committee also include members other than the central bank, and its board of directors is composed of central bank governors of more than 20 member countries. These institutions are generally responsible for the identification and judgment of risks in the financial field. Cross sector is conducive to avoiding regulatory gaps and overlapping problems, and strengthening coordination and information communication. When the financial market is faced with systematic risks, these regulatory coordination agencies play a leading role in promoting the linkage of supervision by various departments and improving the efficiency of event handling.

3.4.3 Formulate Specific Provisions for Coordination Mechanisms

In order to give better play to the effectiveness of cross sectoral coordination and supervision, British and

American countries have formulated detailed institutional arrangements and relevant legal provisions in various aspects such as the operation procedures, conference organization and business content of sectoral coordination, which make the coordination work of regulatory departments procedural and standardized. At the same time, in the process of implementation, if there are unspecified coordination and cooperation contents, they should be remedied in a timely manner through memorandums of understanding. For example, the UK soon released the Memorandum of Understanding between the Ministry of Finance, the Bank of England and the Financial Services Authority after the establishment of the FCA, in which the institutional arrangements of the three departments in terms of information sharing, information exchange and sectoral consultation were described in detail. Through these measures, the regulatory coordination mechanisms of various countries have not only ensured their effectiveness, but also achieved robustness, which can effectively maintain financial stability.

4. Theoretical Analysis of Monetary Policy

4.1 The Theory of Ex-Post Rescue of Traditional Monetary Policy Is Questioned

Since the 1950s, asset values forth have been the main contributor to financial instability. However, a lot of mathematicians are against including asset prices in the target system of the central bank's monetary policy because they don't think it will be sufficient to provide relief when the asset price bubble bursts. This is the basic tenet of the "post rescue theory", which holds that even if the central bank does not act to address the property price foam, as long as the "post rescue" occurs in a timely manner, it can still prevent losses from being incurred by the foam's rupture.[66] However, after the outbreak of the financial crisis, the idea of "ex-post rescue" was widely questioned. The "ex-post rescue" was an asymmetric policy, which might contribute to the moral hazard of market participants, leading investors to expect that the central bank would pay for the failure, thus fuelling speculation.[67] Therefore, contrary to the "ex-post relief theory", a group of economists proposed the "ex-ante response theory".[68] Many scholars believe that the central bank should "reverse operation" and raise interest rates to control when the asset price foam begins to form[69]. The financial crisis has proved that the micro prudential supervision measures aimed at reducing the bankruptcy costs of individual institutions cannot provide financial stability.[70] The view that financial regulation needs to develop towards macro prudence has been gradually agreed.[71] In response to the doubts about the "ex-post rescue theory" of monetary policy, scholars put forward countercyclical dynamic capital regulation,[72] regulation on leverage ratio of financial institutions,[73] provisions on liquidity standards [74]and forward-looking loan loss provisions[75] in the framework of macro prudential regulation. The countercyclical dynamic capital regulation also includes the requirements of increasing capital buffer requirements,[76] improving capital quality requirements,[77] correcting policies aimed at the total amount of capital,[78] and contingent capital. [79]The main purpose is to require financial institutions to hold a higher proportion of capital in the period of economic prosperity than in the period of economic depression. These policies not only belong to the "countercyclical" policies of the macro prudential regulatory framework, but also conform to the policy propositions of scholars on the "ex-ante response theory" of monetary policy, making up for the policy defects of the "ex-post rescue theory" of monetary policy.

4.2 Monetary Policy Objectives Ignore the Concern for Financial Stability

The traditional monetary policy opposes bringing financial stability into the target system and believes that general price stability can give consideration to financial stability. [80]The notion that "price stability may give regard to financial stability" was, however, seriously challenged by the onset of the crisis. The pressure of increasing inflation in the economy is moved from the real estate sector exactly because the central bank is devoted to price stabilization, and asset price froth in some nations occurs while prices are relatively steady.[81] In addition, monetary policy will not only aggravate the financial imbalance, but also cause the phenomenon of neglecting one thing and losing the other to achieve the goal of financial stability through monetary policy.[82]

In addition to matching micro prudential regulation, the proposed macro prudential regulation also fills in for monetary policy's lack of financial stability objectives. With the aim of preserving the security of the entire financial system and reducing the cost of.[83] In order to ensure financial stability, macro prudential supervision involves keeping an eye on risks from the perspective of the financial system as a whole.[84] Additionally, systemic risks are prevented, and financial stability is maintained, through macro prudential oversight. [85]It has therefore been the basic agreement of policy makers to improve macro prudential supervision to make up for the shortcomings of monetary policy objectives in light of the neglect of monetary policy aims to financial stability.[86]

The limitations of monetary policy and the challenges that traditional monetary policy faces can be made up for by the emergence of macro prudential regulation.[87] The potential of macro prudential regulation to resolve the financial imbalance due to the implementation of monetary policy, which has both a time dimension and a macro dimension, serve as the primary example of this. Among these, the revision of the macro dimension is exemplified by the focus placed on economic stability by macro prudential supervision, which effectively reinforces the emphasis placed on public stable prices by monetary policy. In sharp contrast to the "ex-post

relief" notion of conventional monetary policy, the "ex-ante" represents the adjustment of the time dimensions. At the same time, the specific operation of macro prudential supervision is also very similar to monetary policy. For example, the countercyclical dynamic capital supervision and leverage ratio supervision in macro prudential supervision tools are based on strict rules and discretion. The Keynesian school and monetarism, respectively, outlined the flexibility and guidelines of monetary policy. From this vantage point, macro prudential supervision can have its theoretical foundation in traditional monetary policy. However, macro prudential supervision has obvious advantages over the discretionary monetary policy, because the relevant measures of macro prudential supervision can enable the supervised to enhance their expectations of the regulatory measures, thereby reducing the cost of financial institutions being supervised, and this behavior of reducing the expected behavior of the supervised is also a typical "rule" operation mode. Although macro prudential regulation can complement monetary policy, the two are not independent, and they can cooperate and influence each other. For instance, if the monetary policy changes the interest rate, the resulting interest rate fluctuation will impact the financial institutions' balance sheets and produce changes in their capital adequacy ratios.

The volatility in the capital adequacy ratio will also alter the financial institutions' risk appetite, which will impact market interest rates and force monetary policy adjustments. This demonstrates how monetary policy and macro prudential regulation can connect and work together.

5. Research on the Relationship Between Macro Prudential Regulation and Monetary Policy

The academic debate on the relationship between the two policies is very fierce, and the contradiction mainly focuses on whether the two policies are complementary or independent. A considerable number of scholars believe that the two policies can complement each other. Macro prudential policies can not only prevent systemic financial risks, but also promote the development of the real economy. [88]However, financial stability cannot be achieved only by relying on macro prudential policies, which also requires the coordination of monetary policies. [89]Therefore, if the macro prudential policy and monetary policy want to promote each other, the premise is that the two policies can be effectively coordinated.[90] Of course, there are also some differences in the relationship between the two. The independent coexistence of monetary policy and macro prudential policy can improve social welfare. When the two policies are uncoordinated, the effect of improving social welfare is better.[91] The coordination between the two also depends on the use cost of policy tools and the degree of confidence of policy makers in policy tools.[92] On the whole, the research conclusion is that the two policies should be more complementary than independent.[93]

5.1 The Necessity of Macro Prudential Supervision and Monetary Policy Coordination

According to academic study, more academics are endorsing the collaboration between monetary policy and macro prudential regulation, which is described by "going against the wind".

[94]Macro prudential regulation and monetary policy must be coordinated. Countercyclical macro prudential regulation lowers output volatility and contributes to the preservation of financial stability. In instance, the central bank may be able to ensure price stability despite modest changes in interest rates thanks to countercyclical capital adequacy regulation requirements. The role and operation of the financial accelerator can be slowed down simultaneously by the combination of macro prudential regulation and monetary policy.[95] Although macro prudential supervision can promote and complement monetary policy with the goal to address financial imbalance or instability, relying solely on this in order to deal with financial instability in the time dimension will result in an unaffordable implementation cost and an intolerable situation. [96]Macro prudential regulation can achieve the performance of prudential regulation only if it cooperates with monetary policy. Financial stability will be impacted by monetary policy through channels that carry risk (for example, long-term low interests will cause banks and enterprises to over leverage). To establish financial stability in the situation of an overheated economy and excessive leverage, we must "simultaneously" apply a responsible macro prudential policy and a stringent monetary policy. [97]They assessed how monetary policy and macro prudential regulation interacted using a dynamic general equilibrium model. They discovered that if the economy experienced less impact, macro prudential regulation would not be as important, and if macro prudential regulation and monetary policy were not closely coordinated, they could conflict. This also means that the goal of maintaining financial stability can be achieved by the synchronised transmission of monetary policy and macro prudential policy.[98]

5.2 Feasibility of Macro Prudential Regulation and Monetary Policy Coordination

5.2.1 Compatibility Between Macro Prudential Policy and Monetary Policy Objective

The objectives of macro prudential policy and monetary policy may conflict, but in the long run, they are consistent and can coordinate and promote each other. First of all, the two policies are generally aimed at achieving the ultimate goal of stable macroeconomic growth and serving the economic and financial system of a country, but each has its own emphasis on achieving specific content. This enables the two policies to coordinate under certain conditions. For example, if an open economy implements interest rate reduction policies, it may

lead to capital outflows while stimulating economic growth. At this time, it can tighten cross-border capital flows by implementing macro prudential policies to promote the overall healthy development of the economy. Secondly, the objectives of macro prudential policy and monetary policy may complement each other. Because both policies are countercyclical, in some cases, the implementation of monetary policy will eliminate the need for frequent adjustment of macro prudential tools, thus reducing the supervision cost of macro prudential policies. Additionally, macro prudential policy has a wider and more adaptable toolkit than monetary policy. The inadequacies of monetary policy's ineffective supervision of micro industries can be overcome by the application of macro prudential policy measures. In general, both policies are carrying out macro-control, and their policy objectives are mostly macroeconomic variables. Therefore, from the overall perspective, the coordination of the two policies is feasible.

5.2.2 Compatibility Between Macro Prudential Policy and Monetary Policy Transmission Mechanism

The formation of systematic risk mainly comes from two aspects: risk accumulation in time dimension and mutual infection in space dimension. On the time dimension, due to the pro-cyclical nature of the financial system, too fast money supply growth will inevitably accelerate risk accumulation. On the spatial dimension, due to the profit seeking nature of funds or the imperfect market mechanism of fund allocation, funds are excessively concentrated in individual departments, certain industries and a few financial institutions, pushing up the level of leverage and forming a source of risk that affects the overall situation. Preventing systemic risk from time and space dimensions is the starting point for formulating macro prudential policies, and also the main transmission channel. In terms of time dimension, it mainly adopts the countercyclical operation mode of "controlling the general gate of money supply", which is similar to the discretionary mode of monetary policy. On the spatial dimension, the reason why the leverage level can rise significantly in the short term is essentially that the rise in the value of the enterprise's collateral and the sufficient liquidity reduce the financial institutions' estimates of default risk and default loss rate, which is consistent with the asset price transmission mechanism and credit transmission mechanism of monetary policy. The change in real estate prices plays a significant part in the transmission of monetary policy through the process of asset price transmission, such as the volatility of real estate prices. Banks need to use real estate as collateral to issue loans. The value of real estate determines the amount of loans issued. The expansion of monetary policy will promote the rise of real estate prices, which will increase the supply of credit; On the contrary, when real estate prices fall, banks will shrink credit. The contraction of bank credit led to the shortage of available funds for enterprises. This mechanism is the reason for the long-term stagnation of the economy after the bursting of Japan's real estate price foam.[99] In the credit transmission mechanism, under the loose monetary policy, the debt situation of enterprises is improved, the borrower's net value is increased, and the borrower's credit situation will also be improved, so that more bank loans and external financing can be obtained. On the contrary, if the monetary policy is tightened, the financing space of enterprises will be compressed. Of course, the above two mechanisms are also applicable to residents. Therefore, the asset price transmission mechanism and the credit transmission mechanism are the combination points of the coordination of monetary policy and macro prudential policy. The adjustment of monetary policy creates preconditions for enterprises to increase investment and residents to increase consumption, while the macro prudential policy is committed to curbing enterprises' blind leverage and residents' excessive consumption.

5.3 Coordination Mode Between Macro Prudential Supervision and Monetary Policy

Since financial stability is the ultimate goal of both macro prudential regulation and monetary policy, how to coordinate the two is a crucial question in the design of the macro prudential regulatory structure. However, there is no general agreement on how to do this.[100] Therefore, this paper combs the following research models to lay a foundation for the coordination between macro prudential supervision and monetary policy. A real estate market crisis model is constructed to judge whether the coordination of monetary policy and macro prudential supervision can control the leverage ratio cycle. The deposit and loan spreads are supposed to depend on the default rate, monetary policy, as well as other parameters in this model, which also takes into account elements like collateral, currency, and the banking industry. According to the model's study results, monetary policy would increase the default rate and aggravate the default degree under the pressure of future inflation in order to put a cap on the leverage ratio. Therefore, monetary policy and macro prudential regulation can work together to limit the leverage ratio cycle. [101]By constructing an interactive model between optimal monetary policy and inherent commercial bank risk, it can be found that the central bank should cut the interest rate more significantly in the period of sustained economic downturn. In good times, the opposite should be done, with restrictions on more risk-taking or preference. The alignment of monetary policy with macro prudential regulation should depend on prevailing economic conditions, and the relevant policy mix should include mild countercyclical capital ratio requirements and monetary policy rules that respond to asset prices, inflation or leverage. [102]To build a house price fluctuations based dynamic general equilibrium model, and on the basis of the model analysis of monetary policy and macro-prudential regulation cooperation mechanism, the research

results show that if the monetary policy on asset price bubbles, or make a strong response rapid credit expansion, will help to form the main mechanism of response to the financial accelerator. When addressing the cyclical swings in credit, macro prudential regulatory policies can also successfully impede the rapid expansion of credit.[103] An evaluation of the effects of monetary policy and macro prudential supervision cooperate or interact is done using a dynamic stochastic general equilibrium model and data from the US and the Euro area from 1985-2010. The finding indicates that the best mix of policies for preserving financial stability would be monetary policy with price stability as its primary goal, macro prudential supervision with credit cyclical variations as its primary goal, and strong independence between the two. Instead of directly embedding countercyclical mechanism in monetary policy, it constructs loan-to-value ratio based on credit growth rate and takes it as macro prudential policy rule. [104]Through experiments, it is found that the coordination of the two policies is conducive to increasing the welfare of the whole society.[105] The optimal policy mix is an interest rate rule that feeds back on credit and a loan-to-value rule that feeds back on house prices.[106]

5.4 The Concrete Practice of Coordination Between Monetary Policy and Macro Prudential Policy

5.4.1 The United States

With the promulgation of the Dodd Frank Wall Street Reform and Consumer Protection Act, the Financial Stability Regulatory Commission came into being. [107]The FSRC has both decision-making and coordination functions. In terms of decision-making, the Committee holds an absolute leadership position in the macro prudential policy decision-making system. The Federal Reserve can only carry out specific implementation under authorization, and is the regulatory body of systemically important financial institutions. In terms of coordination, the Committee coordinated the positions of various regulatory bodies in the United States, avoided regulatory competition and regulatory gaps among different financial regulatory authorities, helped to form a unified systematic risk response mechanism, and filled the loopholes in traditional financial regulation. However, compared with other developed countries, the United States has fewer types of macro prudential instruments, and specific macro prudential instruments are scattered in different regulatory departments. Due to the lack of practical power of macro prudential tools, the coordination function of FSOC has limited practical effect. [108]In terms of coordination between monetary policy and macro prudential policy, since the response to systemic risk is not only a structural issue, but also a gross one, monetary policy is to some extent the basis of the macro prudential framework. For macro prudential management, the committee is a coordination mechanism and a decision-making body; The Federal Reserve, on the other hand, has the dual role of monetary policy maker and macro prudential policy executor. It not only needs to undertake regulatory functions for financial entities that may cause systemic risks, but also needs to formulate monetary policies for macroeconomic stability. Based on the experience of the United States, it can be seen that systemic risks are the responsibility of the Financial Stability Supervision Committee, which is the top-level framework of the macro prudential management system, it is also the decision-making core of the US financial regulatory system. While the management power of the Financial Stability Supervision Commission is vested by the Federal Reserve, the Federal Reserve is still the leading institution of the macro prudential framework.

5.4.2 England

According to the Financial Services Act 2012, in terms of specific institutional settings, the Financial Services Authority was first divided into the Financial Conduct Authority and the Financial Prudential Authority.[109] The former, as the response function of the Financial Services Authority after the reform, supervised the market behavior and individual behavior of various financial institutions, although relatively independent of the Bank of England. However, in terms of macro prudential supervision, it is required to accept the guidance of the Financial Policy Committee, which is classified as a subsidiary led by the Bank of England, giving consideration to both micro prudential and macro prudential objectives to ensure the prudent operation of financial institutions and maintain the relative stability of the financial system. Secondly, the Bank of England's financial policy committee, which is directly under the Bank of England, has been set up. The governor of the Bank of England also serves as the chairman of the committee. He is mainly responsible for identifying and monitoring the potential risks of the entire financial system, effectively preventing financial systemic risks and avoiding financial imbalances.

5.4.3 EU

The EU's financial regulatory structure has experienced seismic alterations since the financial crisis. According to the EU Financial Regulation Reform Act, the EU has specially established an independent macro prudential supervision institution, the ESRC, with the ECB as the lead party, responsible for monitoring and warning the systemic risks of the entire European financial system, proposing remedial measures, and completing the integration of banking supervision. Specifically, in September 2009, the EU Financial Supervision System Reform Act was voted by the European Council, which established the ESRC to be responsible for macro prudential supervision in the EU region. The President of the European Central Bank leads the work of the

Commission, which is composed of the President of the General Council of the European Central Bank, the Chairmen of the three levels of the Lemfalusi Framework and representatives of the European Commission. It can be seen that the macro prudential supervision policy in the EU region has gradually changed from "fighting independently" to unified and coordinated supervision, while the European Central Bank is specifically responsible for the implementation of macro prudential policies. In terms of the reform of the European Central Bank, after the financial crisis, the European Central Bank also played a more important role in the financial regulatory framework and assumed the responsibility of formulating macro prudential policies. In 2013, the Single Supervisory Mechanism was developed and implemented by the European Council, enabling the European Central Bank to uniformly monitor the banking and financial stability of European countries. The Single Supervisory Mechanism was officially implemented in 2014. Under the single regulatory mechanism in the new framework, the European Central Bank is responsible for supervising the entire European banking industry. In general, the reform of the EU's financial supervision system is mainly to build an independent macro prudential supervision institution with a higher decision-making level, authorize the Central Bank to perform macro prudential functions, and strengthen cooperation and communication with major micro prudential supervision institutions, so as to solve the problems of lack of supervision and conflict of supervision rights and responsibilities caused by the segmentation of supervision.

6. Conclusion

Based on the macro prudential supervision theory, systematic risk theory, monetary policy, combined with the status quo of regulatory structure reform in various countries, this paper adopts comparative analysis and theoretical analysis methods to conduct a more systematic and in-depth theoretical exploration on macro prudential supervision and monetary policy, and mainly draws the following conclusions:

Through comparative analysis, it focuses on investigating the distinction among both macro prudential supervision and micro prudential supervision. Macro prudential supervision is concerned with the connections among financial institutions that make up the financial system as well as the positive feedback between the external financial system and the real economic system. In order to increase the financial system's capacity to tolerate financial imbalances and withstand external shocks, macro prudential supervision keeps an eye on and regulates numerous macroeconomic elements that have an impact on financial stability. Its objective is to keep the entire financial system stable. Micro prudential supervision is unable to effectively track the development and evolution of systemic risk or manage the common risk exposure experienced by financial institutions while the pro-cyclical financial system is in play. Its concentration is on a particular financial institution's risk, and its objective is to sustain that institution's stable growth.

Through the research on systematic risk, this paper analyzes the causes of macro prudential regulation and its internal formation logic, and gives the main principles of macro prudential policy intervention on systematic risk: systematic risk comes from within the financial system to a considerable extent, and the pro-cyclical behavior of most financial institutions is the specific source of its endogeneity. The pro-cyclical behavior will continuously lead to the accumulation of financial imbalances. Through risk contagion, most financial institutions will gradually face highly connected risk exposures, and systemic risks can be self-amplified and self-strengthened through the positive feedback mechanism with the real economy. Macro prudential regulation can take counter cyclical policy measures, adjust regulatory standards or intensity, conduct pre-warning and in-process control, ensure that the financial system is able to withstand the release of financial imbalances and resist exogenous shocks, so as to effectively prevent and resolve systemic risks.

Using the comparative analysis method, this paper makes a comparative analysis of the regulatory structure of some major countries in the world during the post crisis period. It is found that the United States, the United Kingdom, the European Union and other regions in the world started the financial regulatory reform with macro prudential as the main direction earlier after the crisis. These countries and regions have expanded the supervision power of the central bank, and established or attached to the central bank or cross sectoral committees responsible for macro prudential supervision independent of the central bank. Therefore, from the perspective of policy implementation, the coordination and cooperation of the central bank's overall monetary policy and macro prudential policy can better play the synergistic effect of the two policies.

By using the method of literature analysis, it is concluded that the achievement of monetary policy objectives and financial stability objectives with the macro prudential policy is more effective and timely than that with monetary policy alone. In the face of different types of shocks, after the introduction of macro prudential policy tools, not only the fluctuation of inflation has been suppressed, but also the fluctuation of financial stability indicators such as real estate asset prices and commercial bank leverage has been suppressed.[110] This not only verifies the effectiveness of macro prudential policy tools, but also shows that monetary policy and macro prudential policy have consistent goals. In the face of specific shocks, when using different macro prudential policy tools, monetary policy and macro prudential policy are complementary, and there is a basis for policy

coordination, indicating the necessity of coordination between monetary policy and macro prudential policy.[111]

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