Financial Regulation in China and Germany with Special Focus on Banking and Insurance Industries

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Abstract  
The financial industry is a special industry with many risks. It is relevant for all agents within the economy and banks and insurance companies play the most important role. In order to regulate the financial markets, a regulatory authority has various standards to formulate and maintain the market system as healthy as possible. Good financial system is an important prerequisite for ensuring financial security. This paper investigates Chinese and German financial markets, focusing on the banking and insurance aspects. Based on comparative analysis of some regulatory treaties, regulatory risks, and prescribed ratios, it was found that the regulation of German insurance markets is worth learning for China, although in some aspects Chinese market performs better after financial crisis than German market.

Key words: Banking Regulation, Insurance Regulation, Credit Risk, Basel Standard, Solvency II, Exposure Classes, IRB, Standardized Approach.

1 Introduction  
Since the 1990s, both (commercial) banks and regulatory authorities have placed risk management in an increasingly important position. At present, domestic financial supervisory authorities and international regulatory organizations have reached a consensus on risk management, regarding risk management as the core of financial supervision. As for the insurance industry, the regulation generally focuses on the solvency of the insurance companies. At the beginning, solvency supervision focused on capital adequacy only in a minor way. However, regulators begin to put market-based elements into the regulatory system recently.

The objective of this paper is to compare financial regulation in China and Germany, with special focus on banking and insurance aspects. We collect data from the supervisory authority of each country, such as the China Banking Insurance Regulatory Commission (CBIRC), Insurance Association of China (IAC), Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin).

This paper is divided into five sections. The first section provides the introduction and the final section presents the conclusion. The second section provides a literature review, then the third section describes the methodology and data collection. The fourth section displays results and provides a discussion.

2 Literature Review  
Despite the Basel capital adequacy standards adopted internationally, significant variations still exist when implementing in particular countries. Kara (2016) has measured the stringency of capital regulation in 66 major developed and developing countries by estimating a panel data model with fixed effects and performed various robustness tests. Here, China has been regarded as the upper-middle-income level and emerging market, while Germany as the high-income level and advanced market. The investigation shows several pieces of evidence based on the estimation. Firstly, the countries with high average returns to investment or a higher ratio of government ownership of banks choose less stringent capital regulation standards; secondly, capital regulations are less stringent in countries with more concentrated banking sectors due to the expectation of stability. Thirdly, countries with competitive and democratic political systems will choose more stringent capital regulations.

Orhan (2015) has deciphered banking regulation in China; in the study, the author investigated three cases of financial risk management by CBRC. Based on the comparison, the study concludes that although CBRC has its prudent approach to keep the stability of banking system, it varies depending on the actors involved and the central government’s policy objectives.
Kim et al. (2013) use the index of the restrictions on bank activities, capital regulation, and measure of government-owned banks and official supervisory power to carry out a survey on bank regulations and supervision. The result suggests that implementation of deregulatory measures to ease the entry requirements may weaken the stability of the banking sector. Furthermore, restrictions on bank activities and entry requirements have decreased the likelihood of a banking crisis, while capital regulation and government ownership of banks have increased the likelihood of a currency crisis.

Moreover, Cucinelli et al. (2018) has investigated on the bright side of credit risk measurement under banking regulation, noted that banks using internal rating-based (IRB) approach for credit risk measurement were able to curb the increase in credit risk driven by the macroeconomic slowdown more successfully than banks under the standardized approach (SA); hence IRB demonstrates superior performance to SA. Therefore, we will compare the selected countries banking regulation through the use of credit risk measurement.

In the insurance market, risks can be roughly divided into three categories: underwriting risks, investment risks, and operational risks, among which investment risks include credit risks and market risks related to investment activities. Insurance companies play an important role in the economic growth of the nation. Nagar (2005) found the main contributions of the insurance industry is to raise the resources in the long-term because it can increase the long-term potential investment of the economy. Santomero (1997) mentioned that solvency regulation is considered important because there is a strong systemic risk to the insurance industry, which could lead to economic undermined.

Zanjani (2002) observed a positive relationship between insurer default risk and policyholder termination rates if considering consumer influences. Yu et al. (2006) found that insurer investment in risky assets and the volatility of the asset, portfolios are inversely related to franchise value. Baranoff and Sager (2007) found that when ratings decreased, the demand for life insurance products was also reduced, as measured by the number of policies written. Wiener (2007) mentioned Solvency II project is based on a combination of the risks facing insurance firms. The main outcome of the Solvency II project was changing the method of calculating solvency capital.

3 Methodology of Research and Data Collection

3.1 Banking

First, to measure the credit risk of banks, BCBS has specified two broad approaches to calculating risk-weighted assets (RWA), as mentioned in section one: SA and the IRB approaches. Most banks around the world use the SA for credit risk. Under this approach, supervisors set the risk weights that banks apply to their exposures to determine RWAs. Under the SA, banks use a prescribed risk weight schedule to calculate RWAs. In Basel II, the risk weights are contingent on asset classes that specify loans to sovereigns (countries), corporations and banks. Simultaneously, the risk weights are generally linked to external ratings assigned to the borrower, while Basel III requires banks using credit ratings to conduct sufficient due diligence.

For claims on the Bank for International Settlements (BIS), the International Monetary Fund (IMF), the European Central Bank (ECB), the European Commission (EC) and the Multilateral Development Banks (MDBs), the risk weight is 0%. For claims on banks, national supervisors can choose to base capital requirements on the ratings of the country in which the bank is incorporated. Meanwhile, the standard rule for retail lending includes credit cards, overdraft, auto loans, personal finance and small business, at a risk weight of 75%. When claims are secured by residential mortgage, the risk weight is 50%. Claims secured by commercial real estate have a risk weight of 100% (Hull, 2012; BCBS, 2017). The IRB approach for credit risk allows banks (under certain conditions) to use their internal models to estimate credit risk, and therefore RWAs. There are two main IRB approaches: Foundation IRB (F-IRB) and Advanced IRB (A-IRB).

Under the F-IRB Approach, a bank is required to estimate only the borrower’s probability of default (PD). To verify the PD, the bank must use at least five years of relevant loan performance data from various borrowers. The other risk factors of the credit model – such as loss-given-default (LGD) and exposure-at-default (EAD) – are provided and determined by the bank’s supervisor. Under the A-IRB approach, a bank uses its internal estimates of risk parameters such as PD, LGD, and EAD. At least seven years of historical data must be used for verification purposes. For all but large corporate exposures, a standard two and a half years may be assumed for maturity, subject to supervisor agreement. With the A-IRB approach, the bank must estimate all credit risk model components, including data collection, data management and modelling techniques. It is generally agreed on, that the process demands more sophisticated commitment by the bank. Approximately 50% of bank capital requirements are generated through IRB, although it is not mandatory to use it in Europe (Resti, 2016).

In this study, we are comparing China and Germany, an emerging market and an advanced market, respectively, with different economic statuses and currencies. Thus, in order to compare the SA and IRB approaches, we need to collect the credit risk exposure classes and amounts under both methods from each
central bank data series system. Furthermore, based on valid data, we will apply some metrics of risk and performance to compare the results more directly.

Capital requirements are regulated for several capital ratios, i.e., Tier 1 capital ratio, measured by its equity capital and disclosed reserves—to its total risk-weighted assets. It is a key measure of a bank’s financial strength that has been adopted as part of the Basel III Accord on bank regulation.

\[
\text{Tier 1 Capital} = \frac{\text{Tier 1 Capital}}{\text{RWAs}}
\]

The capital adequacy ratio, also known as the capital to risk-weighted assets ratio, measures a bank’s financial strength by using its capital and assets. The equation is as follows:

\[
\text{CAR} = \frac{\text{Tier 1 Capital} + \text{Tier 2 Capital}}{\text{RWAs}}
\]

Generally, a bank with a high capital adequacy ratio is considered safe and likely to meet its financial obligations. The measurement of credit risk of banking can utilize non-performing loan (NPL) ratio, which can be calculated as follow:

\[
\text{NPL ratio} = \frac{\text{NPL}}{\text{Total loans}}
\]

NPL coverage ratio refers to the ratio of loan loss provisions to non-performing loans, mainly reflecting the ability of commercial banks to make up for loan losses and the ability to prevent loan risks.

\[
\text{NPL coverage ratio} = \frac{\text{loan loss provision}}{\text{npl}}
\]

3.2 Insurance

The World Bank (2006) found insurance supervision relies upon the policy, well-developed financial market infrastructure, and efficient financial market. Fu et al. (2016) found there are four main modes of insurance supervision, there are decentralized free supervision, highly self-regulated supervision, supervision based on system construction and administrative supervision.

For the German market, it is under supervision based on system construction. It gives consideration to safety and efficiency, guarantees the asset safety of insurance companies and protects the interests of customers on the basis of guaranteeing the safe operation of insurance companies. In this mode of supervision, there will be very strict and standard regulations.

Chinese supervisory mode is a combination of administrative supervision and supervision based on system construction, which is also a “centralized and single regulatory system” and has very strict management. The financial supervision and administration department of the State Council is responsible for the supervision and management of the insurance industry based on Insurance Law of the People’s Republic. Chinese insurance supervision has strict requirements on insurance business scope and market entry threshold. Peng (2000) mentioned the main basis for the strict supervision of the Chinese insurance market is the prominent information asymmetry, disorderly competition, and undesirable competition.

Although Solvency is a very important indicator for Chinese insurance regulatory and German insurance regulatory, in both cases, it comes from different legal norms. There are two main ratios related to the Chinese insurance market, they are acceptable asset-liability ratio and solvency adequacy ratio.

The acceptable asset-liability ratio is required to be lower than 90%, is calculated as:

\[
\text{Acceptable asset—liability ratio} = \frac{\text{ranking liabilities}}{\text{ranking assets}} \times 100
\]

The solvency adequacy ratio needs to be larger than 100%, if this ratio is below 100%, it may be listed as the key regulatory target. Its is calculated as:

\[
\text{Solvency adequacy ratio} = \frac{\text{ranking assets—ranking liabilities}}{\text{minimum solvency}}
\]

Insurance density and insurance penetration can help to judge the development degree, potential, and speed of an insurance market. The larger these two indicators are, the better the development of the insurance industry. In this paper, we can use these two indicators to compare the development of the insurance industry in the German market and the Chinese market. The formula for calculation is shown as:

\[
\text{Insurance density} = \frac{\text{premium income}}{\text{population}}
\]

\[
\text{Insurance penetration} = \frac{\text{premium income}}{\text{GDP}}
\]

Under the regulation of Solvency II, there are three important indicators: technical provision (TP), solvency capital requirement (SCR), and minimum capital requirement (MCR). SCR and TP are different in function. SCR is mainly used to absorb the company’s losses and ensure that the company has enough capital to pay when facing a large number of losses, and does not need to be liquidated. TP is used to protect the...
policyholder, to ensure that after the company uses up the capital due to losses, the company still can pay the compensation, so as to protect the interests of the policyholder.

The technical provisions are calculated as:

\[
\text{Technical Provisions} = \text{Best Estimate} + \text{Risk Margin}
\]

(9)

To measure the risk margin, two methods can be used, they are percentile method and cost of capital method. As concerns the calculation of SCR, there are two main methods: Internal models and Standard Formula. The relationships between SCR, MCR, TP, risk margin and best estimate is illustrated in Figure 1.

**Figure 1.** Relationships between the indicators from solvency II.

4 Compared results and discussion

In this section, we will discuss the banking regulation and insurance regulation of China and Germany, with special focus on credit risk measurement, capital requirements and solvency.

4.1 Banking

China

Chinese banking system is regulated by the China Banking Insurance Regulatory Commission (CBIRC), combined with China Insurance Regulatory Commission (CBIC) and China Banking Regulatory Commission (CBRC) in April 2018. CBIRC is the statutory banking regulatory agency and direct offices of the State Council, which is not an independent authority. The responsibility of the CBRC to formulate the law draft and regulations of the banking industry and the basic system of prudential supervision has been transferred to the People’s Bank of China (PBOC). Therefore, PBOC also has considerable power over the Chinese banking system. In addition to the typical central bank’s responsibility for monetary policy and representing the country in international forums, the role of the PBOC is to reduce overall risks and promote the stability of the financial system.

With the introduction of new capital requirements effective on 1 January 2013, Chinese banking regulation requires a minimum CET1 ratio of 7.5% compared to 7.0% under Basel standards. This higher ratio leads to a slightly higher recognition of minority interest than in the Basel standards, producing slightly higher capital ratios. According the CBIRC’s Provisioning Rules, banks must have an adequate amount of aggregate provisions in order to enhance the loss absorbency of individual banks and the banking sector as a whole.

<table>
<thead>
<tr>
<th>Table 1. Adequate amount of aggregate provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total loan loss provision to loan ratio</td>
</tr>
<tr>
<td>Provisioning coverage ratio</td>
</tr>
</tbody>
</table>

The new capital requirement clarifies three minimum capital adequacy ratio requirements, that is, the core Tier 1 capital ratio, other Tier 1 capital ratio and the capital adequacy ratio should not be less than the minimum requirement as following table shows. The capital adequacy ratio of systemically important banks and non-systemically important banks under normal conditions shall be not less than 11.5% and 10.5% respectively.
Table 2. Minimum capital requirement

<table>
<thead>
<tr>
<th></th>
<th>Non-systemically important bank</th>
<th>Systemically important bank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Core Tier 1 Capital</td>
<td>Other Tier 1 Capital</td>
</tr>
<tr>
<td>Till end of 2013</td>
<td>5.50%</td>
<td>6.50%</td>
</tr>
<tr>
<td>Till end of 2018</td>
<td>7.50%</td>
<td>8.50%</td>
</tr>
</tbody>
</table>

The capital requirement increasing the additional capital requirements for systemically important banks, which shall be tentatively determined as 1%. PBOC adopt Macro Prudential Assessment (MPA) to form three classes of systemically important financial institutions (SIFIs), that is, National class, Regional class, and Common class.

Table 3. Chinese systemically important bank

<table>
<thead>
<tr>
<th></th>
<th>ICBC ABC BOC CCB BOCOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-SIFIs</td>
<td>The largest commercial bank with the largest asset size in each province</td>
</tr>
<tr>
<td>R-SIFIs</td>
<td>CIFIs</td>
</tr>
<tr>
<td></td>
<td>National joint-stock banks</td>
</tr>
</tbody>
</table>

In addition, banks in China should adopt internal rating-based (IRB) approach to calculate the credit risk capital. And the CBRC encourages banks to apply advanced IRB approach. Banks that are to adopt IRB approach should meet the supervisory requirements and be subject to the CBRC’s approval before the adoption. Till 2018, there are six banks being permitted from CBRC to apply F-IRB approach. The CBRC allows banks to adopt the IRB approach in a phased manner, but when the bank is approved to apply the IRB approach, the asset coverage ratio to apply the IRB approach should be no lower than 50%.

\[
\text{Asset coverage ratio} = \frac{\text{RWAs(IRB)}}{\left(\text{RWAs(IRB)} + \text{RWAs(other)}\right)}
\]

(10)

Compared to Basel standard, CBRC did not establish the value of the scaling factor to be applied to the risk weighted asset amounts for credit risk assessed under the IRB approach.

Figure 2. SA exposure classes of Chinese banking in 2017

Figure 2 displays the share of risk classification under SA. Chinese banking applies the highest risk weights in sovereign, which is followed by financial institutions and equity.

Germany

Banks in Germany are under the supervision of Federal Financial Supervisory Authority (BaFin), Deutsche Bundesbank and ECB. The primary function of BaFin is to ensure that institutions are adequately endowed with capital. The Capital Requirements Regulation (CRR) supervised the eligible capital, which is the sum of Common Equity Tier 1 capital, Additional Tier 1 capital and Tier 2 capital.

Institutions that opt to use the IRB Approach require authorization from BaFin. For institutions that opt to use an internal rating system or an equity risk model to determine the institution’s capital requirements for credit risk under the IRB Approach, prior approval from BaFin is additionally required. BaFin will grant this approval.
based on the results of a suitability examination. Any major changes or amendments to the scope of application must also be authorized by BaFin.

There are 19 institutions being approved to use F-IRB Approaches with their own estimate of the PD in the exposure classes such as central governments, institutions and corporate, simultaneously, 17 institutions such as Deutsche Bank AG to use A-IRB Approach with their own estimate of the PD, LGD, EAD and effective maturity in the exposure classes as we mentioned before. Also, 7 institutions only can use IRB Approach to calculate the retail exposure class.

The basic requirement under Basel shows as follow.

<table>
<thead>
<tr>
<th>Table 4. Minimum capital requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital adequacy ratio ≥ 8.00%</td>
</tr>
<tr>
<td>CET1 ≥ 4.50%</td>
</tr>
<tr>
<td>Tier 1 ratio ≥ 6.00%</td>
</tr>
</tbody>
</table>

Based on the analysis of the comparability of RWAs conducted by the BCBS on banks worldwide and by the European Banking Authority (EBA) on European banks alone, the committee found that the IRB approach results in excessive variability in RWAs and demonstrates limited reliability of parameter estimates such as the probability of default (PD) and loss-given-default (LGD). These results have highlighted the importance of introducing new constraints on the parameters estimated by banks that use internal models.

**Figure 3. SA exposure classes of German banking in 2017**

Under the SA, for certain exposure classes institutions may determine the risk-weighting of credit risk positions on the basis of external credit ratings. One condition for doing so is that these ratings have been published by recognized rating agencies or by export credit insurance agencies. Figure 3 displays the share of risk classification under SA. Similar to China, Germany apply the highest risk weights in central governments or central banks, which includes exposures to regional governments or local authorities, public sector entities, multilateral developments banks and international organizations.

4.2 Insurance

**China**

There are three main insurance supervision ways in the insurance industry: off-site monitoring and public information disclosure; on-site inspection; and regulatory regulation. For public information disclosure, the supervision institution needs to establish an efficient requirement. In general, the on-site inspection aims to compare the insurance company's risk structure and ability to bear the risk and find any issues that may affect the insurer’s ability to take on long-term obligations to policyholders. Regulatory regulation pays attention to the legality of the form of the insurance business and punishes the illegal forms.

The Chinese insurance market applies on-side inspection as the supervision method. Because this method has more comprehensive and effective supervision of the entire insurance industry, this way, the illegal operators can be multiplied, and the public interest can be better protected. In terms of the content of supervision, China pays more attention to the solvency of insurance companies, and also focuses on the operating behavior of insurance companies. SCNPC (2015) requires the smallest registered capital for the insurance company is 0.2 billion RMB; the basic insurance clauses and premium rates for the main types of commercial insurance shall be settled by the financial supervision and regulation department; if the companies operating is non-life insurance,
the amount of the withdrawal and carry-over shall be equal to 50% of the premium retained in the current year and so on.

In this paper, we focus on the solvency adequacy ratio and acceptable asset-liability ratio, for the data collection, there are three typical insurance companies were chosen to represent the reinsurance company, non-life insurance company, and life insurance company. The results are shown in Table 5.

**Table 5.** Solvency adequacy ratio and acceptable asset-liability ratio in Chinese insurance companies.

<table>
<thead>
<tr>
<th></th>
<th>Solvency adequacy ratio</th>
<th>Acceptable asset-liability ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reinsurance</td>
<td>non-life insurance</td>
</tr>
<tr>
<td>2019.03</td>
<td>169.17%</td>
<td>224.47%</td>
</tr>
<tr>
<td>2018.12</td>
<td>178.43%</td>
<td>228.58%</td>
</tr>
<tr>
<td>2018.09</td>
<td>180.35%</td>
<td>226.54%</td>
</tr>
<tr>
<td>2018.06</td>
<td>208.95%</td>
<td>231.84%</td>
</tr>
<tr>
<td>2018.03</td>
<td>214.48%</td>
<td>223.31%</td>
</tr>
<tr>
<td>2017.12</td>
<td>218.40%</td>
<td>229.20%</td>
</tr>
<tr>
<td>2017.09</td>
<td>200.40%</td>
<td>242.24%</td>
</tr>
<tr>
<td>2017.06</td>
<td>207.28%</td>
<td>237.04%</td>
</tr>
<tr>
<td>2017.03</td>
<td>218.21%</td>
<td>232.57%</td>
</tr>
<tr>
<td>2016.12</td>
<td>209.21%</td>
<td>232.04%</td>
</tr>
<tr>
<td>2016.09</td>
<td>231.10%</td>
<td>245.39%</td>
</tr>
<tr>
<td>2016.06</td>
<td>215.17%</td>
<td>250.75%</td>
</tr>
<tr>
<td>2016.03</td>
<td>229.78%</td>
<td>249.05%</td>
</tr>
</tbody>
</table>

From Table 5, it is easy to find that the solvency adequacy ratio of the life insurance company is the highest, and the reinsurance company’s solvency margin ratio is the lowest. However, all kinds of insurance companies reach the requirement issued in “Insurance Law of the People’s Republic”. As concerns the acceptable asset-liability ratio, all the results are smaller than 90%, they are also qualified.

For the company whose solvency adequacy ratio is more than 70% but lower than 100%, the China Insurance Regulatory Commission (CIRC) may require that the company put forward the improvement scheme and deadline to achieve minimum solvency amount. If the company fails to achieve, CIRC can claim to the company take the capital increase, shall be ordered to deal with reinsurance, restrictions on business scope, limiting dividends to shareholders, limit scale of fixed assets purchased and limit operating expenses, the necessary regulatory measures such as restrictions set up branches, until it reaches minimum solvency amount.

For the company whose solvency adequacy ratio is between 30% and 70%, the CIRC in addition to take the measures listed in the preceding paragraph, but also ordered the company to auction non-performing assets, shall be ordered to transfer the insurance business, limit executive compensation levels and on-the-job consumption level, to limit the company's commercial advertising, shall be ordered to stop to start a new business as well as the China insurance regulatory commission can consider other measures to be necessary.

For a company whose solvency adequacy ratio is less than 30%, the CIRC may take over the insurance company in accordance with the provisions of the insurance law in addition to the measures listed in the preceding two paragraphs.

**Germany**

On May 1, 2002, Germany merged the federal bank of Germany with the insurance supervision and securities supervision institutions to form a unified supervision organization – BaFin. BaFin is authorized by law to regulate all financial institutions, including banks, financial services institutions, insurance companies, and can impose penalties on those it regulates.

In practice, there are three supervision aspects: supervisory disclosures, on-site inspections and risk classification. One of the objectives of Solvency II is to improve transparency in the insurance sector. Thus, undertakings and supervisors are supposed to provide comprehensive information to the public. The German insurance market's disclosure obligations are governed by section 318 and section 319 of the German Insurance Supervision Act (Versicherungsaufsichtsgesetz).

On-site inspections using a risk-based approach. In addition to the results of the risk classification, one of the factors BaFin considers is whether the insurer has recently conducted on-site inspections and temporary on-site inspections. In 2017, the Insurance Supervision Directorate conducted 115 on-site inspections, compared with 105 in 2016. The increase in the number of site inspections compared with the previous year reflects an increase in internal model reviews and more regular inspections.

BaFin evaluates the risk classes of the supervised insurance undertakings and uses it to define how closely the insurers are supervised. Insurers are allocated to classes using a two-dimensional matrix that reflects their
market impact and quality. The market impact of life insurance companies is measured on the basis of their total investments. The relevant parameter for health insurance companies, property insurance companies, and reinsurance companies is their gross premium income. The quality of an insurance company is based on an assessment of its net assets, financial position and results. Market impact is measured on a scale of "very high", "high", "medium" and "low". BaFin evaluates the first two factors using specific insurance indicators, while qualitative criteria are used to assess management quality. The rating system adds together the ratings of various factors to form an overall rating of four levels, from "A" (high quality) to "D" (low quality). Figure 4 shows the risk classification results in German insurance market in 2017.

**Figure 4.** Risk classification results in German insurance market in 2017.

From Figure 4, we can see that in the risk classification process, BaFin rated 61.2% of insurance companies as "A" or "B".

4.3 **Comparison among selected countries**

**Banking**

In general, China and Germany use similar methods to measure credit risk, while through comparison, not only the proportion of using SA or IRB is different, but the performances are different as well. The following discussion will present the comparison among these two countries.

In December 2017, the Basel Committee endorsed the outstanding Basel III post-crisis regulatory reforms, which seek to restore credibility in the calculation of risk-weighted assets (RWAs) and improve the comparability of banks’ capital ratios (BCBS, 2017). With the introduction of these reforms, two main revisions are required concerning credit risk management: an amendment to the SA for credit risk, enhancing its robustness and risk sensitivity; and setting a new SA for credit valuation adjustment (CVA) risk. Setting constraints on the use of the internal ratings-based approach through such as setting the output floor for RWAs should fixed at 72.5% to curb the unintentionally large deviation in capital requirements. (BCBS, 2016).

First, given the approaches of the selected countries, Figure 5 displays the credit risk exposure constituted by the standardized and IRB approaches, collected from the proportion of the SA and IRB in each country. We selected 2017 as the benchmark year. China started to adopt the IRB approach in 2013, and only 6 largest
commercial banks have been approved by CRIBC to use IRB (A-IRB), there are amount of small-size commercial banks using the SA as the main approach, while in the future, IRB approach will become the main approach for all commercial banks in China; this may create the challenge for CRIBC to decide the best response to the Basel IV. Compared with China, Germany has relative high proportion of entities using IRB approach.

Following figures show the NPL ratio and NPL coverage ratio between China and Germany, we can see from the beginning of 21st century, China experienced high NPL ratio due to the imperfect banking regulation, compared with Germany, China has a relatively low level of NPL ration after 2008. As we mentioned in section before, CBRC actively reponse to the Basel standard, some capital requirement are more strict than Basel in transition. In another aspect, Chinese banking asset quality growing fast during past five ten yeasers. As for provision ratio, China has lower provision ratio than Germany before 2007, but shows an rapid growth after financial crisis, reach highest at 282.72% in 2013 due to the implantation of new capital requirement of CRBC, which requires provisioning coverage ratio should be no less than 150%. While if the NPL ratio are of relatively the same level, too much higher provision may lead to redundant and the profit is drop.

Figure 6. NPL ratio in China and Germany from 2002-2016

Figure 7. Provision ratio in China and Germany from 2002-2016

Figure 8 shows the capital adequacy ratio in both countries, China experienced a collapse during 2004-2005, due to the state-owned commercial banks have a property rights system in which the state bears unlimited liability, with the expansion of bank assets, the problem of capital adequacy ratio has emerged. Under the capital injection from the government, the capital adequacy ratio starts to maintain 10% level, which is sufficient for Basel and CBIRC rule. In opposite, Germany has maintain a stable level of CAR, which indicates great ability to absorb potential risks.

In general, difference between China and Germany are basically due to the economic status, China start to adopt Basel standard later than Germany, meanwhile, the banking regulation system are imperfect during early 21st century. As an emerging market, China has rapid growth not only in the economic sense since the regulation systems developing as well; therefore, the regulation is getting to be more rigorous and mature.
Insurance

The comparison of insurance penetration and insurance density of the Chinese insurance market and the German insurance market from 2007 to 2016 is shown in Figure 9 and Figure 10.

Figure 9. The insurance penetration from 2007 to 2016.

![Insurance penetration](image1)

Figure 10. The insurance density from 2007 to 2016.

![Insurance density](image2)

Figure 9 and Figure 10 shows the German insurance market is better developed than China's, and insurance penetration is obviously much higher. However, the insurance penetration rate in China is much better than the insurance density, and China life insurance has a good market share in the global life insurance market. One reason why the German insurance market has developed better than China's is that the German insurance market has a long history and a mature regulatory system. Second, insurance regulation in Germany is very strict. It is not only subject to the regulation of BaFin but also needs to meet the solvency II requirements specified by the EU.

There are indeed many places in China for insurance regulation that are worth learning in Germany. China can consider rationally laying out regulatory branches according to the actual situation of the development of the insurance industry in various regions, increase the extension of supervision, and effectively improve the efficiency of supervision. And China should introduce external supervision forces and gradually build a comprehensive social evaluation system for the insurance industry.

With the rapid development of the insurance industry, insurance contract disputes continue to emerge. This aspect is because the current transparency of China’s insurance industry is not high, information asymmetry, insured people have low awareness of insurance companies and insurance contracts. The more important reason is that insurance agents' behaviors in the exhibition industry are not standardized, especially the misleading behaviors of sales are repeatedly prohibited. Thus, China also should improve the threshold for entry, increase the cost of non-compliance, and improve the management system of insurance agents.

5 Conclusion

Financial regulation between China and Germany, from the aspect of banking regulation; firstly, Chinese regulation system formulated later than Germany and rapidly developing during recent years; in opposite, Germany has a developed and advanced regulation system, which provides a stable and soundness financial market. Secondly, China has stricter rule than Basel standard, which create great ability to absorb credit risk.
Thirdly, China has higher provision coverage ratio than Germany, due to commercial banks use loan loss provision as future potential profit.

For the insurance regulation, German insurance regulation is more stringent and more perfect because the German system's sophisticated financial legal system has laid a good foundation for German insurance supervision, allowing them to follow the law; compared with China, Germany's insurance supervision is more comprehensive, a multi-level regulatory system provides institutional guarantees for its regulation. And Germany has also fully utilized the regulatory power of society, which is worth learning for the Chinese insurance market.

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