
Limited diversity— business models of German cooperative banks

ANDREAS BLEY

Andreas Bley, Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e.V. (BVR) / National Association of German Cooperative Banks (BVR), e-mail: a.bley@bvr.de

Summary: The structural diversity of the German banking market and the associated variety of business models is thought to have been an important factor in the stability of the German banking market in recent decades. This diversity is manifested both in the three-pillar structure of the German banking industry and within the pillars themselves. However, empirical analysis reveals that there is limited variety within the business models used by the German cooperative banks. Almost all cooperative banks concentrate on the lending and deposit-taking business with customers. Within the traditional business model, two different types of business can be identified, one of which is more focused on lending and the other on deposit-taking.

Zusammenfassung: Die strukturelle Vielfalt auf dem deutschen Bankenmarkt und die damit verbundene Vielfalt von Geschäftsmodellen dürfte in den vergangenen Jahrzehnten ein wichtiger Stabilitätsfaktor am deutschen Bankenmarkt gewesen sein. Diese Vielfalt zeigt sich zum einen in der 3-Säulen-Struktur der deutschen Kreditwirtschaft, zum anderen aber auch innerhalb der Säulen selbst. Für die deutschen Genossenschaftsbanken dokumentiert eine empirische Analyse eine begrenzte Vielfalt der Geschäftsmodelle. Fast alle Genossenschaftsbanken konzentrieren sich auf das Kredit- und Einlagengeschäft mit Kunden. Innerhalb des traditionellen Geschäftsmodells lassen sich zwei unterschiedliche Geschäftstypen identifizieren, von denen der eine stärker aktiv- und der andere stärker passivlastig ausfällt.

→ JEL classification: G21, G32, P13

→ Keywords: German banking market, diversity, cooperative banks, business models, corporate governance

I Introduction

The idea that the structural diversity of banking institutions is a major strength is widespread in the German banking industry. As Hans-Walter Peters, President of the Association of German Banks (BdB), puts it: “The diversity of institutions and business models has served Germany and the German financial market well” (Peters 2016). Diversity in this context is primarily understood as referring to the three-pillar model of the banking industry, represented by private banks, cooperative banks, and savings banks. But Peters also points to the variety of business models, size, and regional focus within the three individual pillars. Support for the proposition that diversity is advantageous also comes from academic literature. Making the case for diversity within banking, Schmidt (2011) says: “The three-pillar system seems [...] to be a guarantor for the stability of the banking system.”

The impression that this diversity within the German banking landscape has a positive effect on the overall stability of the banking market in Germany is supported by external studies. In his book on the role of diversity in complex systems, Scott E. Page concludes: “Diversity can provide insurance, improve productivity, spur innovation, enhance robustness, produce collective knowledge, and, perhaps most important in light of these other effects, sustain further diversity” (Page 2011: 3). But, according to Page, the case for diversity comes with some caveats. Diversity is not a magic bullet and may even contribute to the instability of the system in unfavorable circumstances. It is therefore not easy to establish exactly how robust a complex system is. “The right amount and types of diversity depend on many attributes of a system—connectedness, interdependencies, and rates of adaptation—and they may change over time.” (Page 2011: 255)

The question of what constitutes the optimum institutional structure of the banking industry with regard to an adequate—and, in the event of crises, robust—supply of financial services has so far received little attention in the academic literature. Schmidt et al (2016: 563) argue that savings banks and cooperative banks could play an important role in the future because diversification provides risk protection “with the same argument with which ecologists plead for biodiversity and for safeguarding endangered species: they help us to retain a kind of social capital whose value we might overlook because we don’t see it today”. Policymakers should therefore not give up the diversity of the German banking structure lightly: rather, they should maintain the political and economic flexibility to ensure that this diversity is retained as part of the social capital of society.

This argument may well be justified, but it does not in itself go far enough. The case for the three-pillar system in which savings banks and cooperative banks play a major role should not be reduced to a kind of ‘species protection’ measure to guard against future challenges. The three-pillar structure was proven to have a stabilizing effect during the financial crisis. Ayadi et al (2009, 2010) conclude that the coexistence of purely profit-oriented commercial banks (“shareholder value banks”) with the savings banks and cooperative banks, which are committed to broader objectives (“stakeholder value banks”), has contributed to the resilience of the banking industry in several European countries, including Germany. The historical persistence of the German banking industry and the absence of major banking crises in the 60 or so years from the post-war period to the global financial crisis are cited as evidence of its relative robustness (Schmidt et al. 2016).

Part of the reason why savings banks, cooperative banks, and other regional banks proved to be stable during the financial crisis was because they had relatively little exposure to toxic assets. They also had a stable deposit base and a sufficient equity base. This was primarily due to their tradi-

tional business model based on the deposit-taking and lending business with retail and corporate customers. Schmidt (2016: 116) concludes: “Despite some problems of their central financial institutions, also during the financial crisis savings banks and cooperative banks have proved to be a stabilizing factor for the German financial system and economy”. Evidence of this can be found in the analysis of lending, deposit-taking, and earnings trends during the financial and sovereign debt crisis (Hofmann 2013). Both banking groups have proven to be very competitive in recent decades. Over the long term, the profits of the savings banks and local cooperative banks were above average, while the volatility of their key earnings figures was below the industry average.

Detailed studies of the banking structure provide a reliable basis for an informed assessment of the importance of institutional diversity for the stability of the banking sector. More attention has been devoted to this topic in the academic literature in recent years, especially in the form of business model analyses. In all the empirical studies, business models are analyzed on the basis of similarities between banks that are determined using a cluster analysis of key financial performance indicators (Ayadi et al. 2011, 2014, 2015, Roengpitya et al. 2014, Farné et al. 2017). Below, a simple descriptive analysis of the business models of the cooperative banks in Germany is carried out on a similar methodological basis.

2 Business models of cooperative banks in Germany

The international literature distinguishes key business models of banks based on key financial performance indicators. The study by the Bank for International Settlements (BIS 2014), for example, differentiates between (1) retail-funded commercial banks, (2) wholesale-funded commercial banks, and (3) capital-markets-oriented banks. To some extent, model (1) is further divided into a focused retail model and a diversified retail model, the latter with a lower proportion of customer loans on the assets side of the balance sheet and thus a larger proportion of trading assets and bank loans (Ayadi et al. 2015). On the equity and liabilities side, the differences are small.

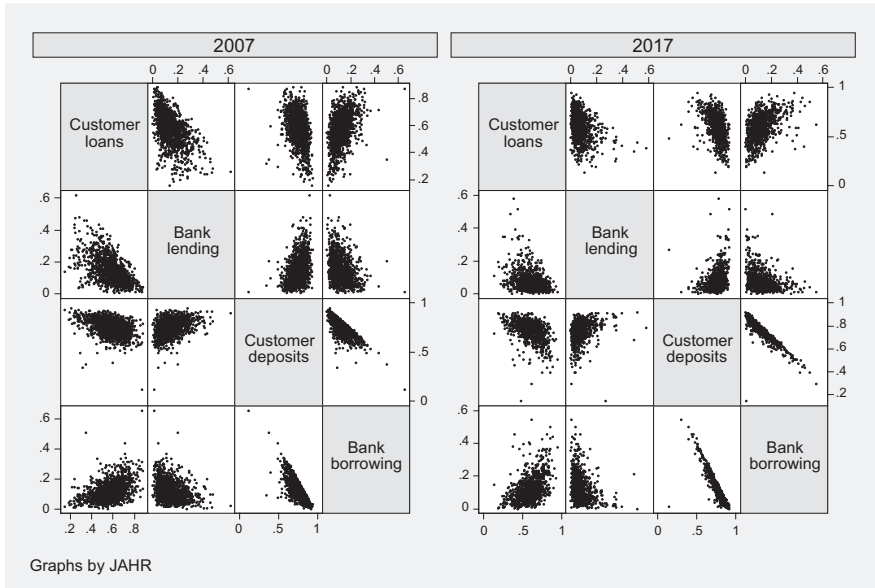
In order to classify the German cooperative banks according to this typology, specific key balance sheet indicators were calculated at individual bank level for an almost complete sample. The study looked at 1,215 cooperative banks in 2007 and 912 in 2017. In its banking statistics, the Bundesbank reports a total of 1,234 and 918 cooperative banks in those two years (Deutsche Bundesbank 2008, 2018). The following analysis is based on four key figures, each in relation to the size of the balance sheet:

1. Customer lending (loans to non-banks)
2. Customer deposits (deposits and borrowing from non-banks)
3. Lending to banks
4. Deposits and borrowing from banks

The analysis does not distinguish between the different customer groups. Taking all cooperative banks together, retail and corporate customers dominate with 78 percent of loans and 86 percent

Figure 1

Scatterplot matrix of German cooperative banks balance sheet indicators



Source: National Association of German Cooperative Banks (BVR).

of deposits (end of 2017). Other customers include the public sector, foreign customers, and non-profit organizations, which include associations, federations, political parties, and churches.

Most German cooperative banks focus on the deposit-taking and lending business with retail and corporate customers. Consequently, the scatterplots show a very high concentration of banks with high proportions of customer loans and deposits (Figure 1). The proportion of bank loans and deposits is comparatively low. In 2017, for example, customer loans accounted for between 50 percent and 75 percent of total assets at around two-thirds of the cooperative banks; customer deposits accounted for between 70 percent and 85 percent of total equity and liabilities at over two-thirds of the cooperative banks (Figure 2a, Figure 2b).

A comparison of 2007 and 2017 shows that the balance sheet structure variables are generally highly stable over time, although there are some slight shifts. In recent years, the volume of loans as a proportion of total assets has risen moderately and the proportion of deposits within total equity and liabilities has risen slightly, but the dispersion has not noticeably increased. The shifts result from the above-average growth of the aggregated total assets of the cooperative banks by 3.5 percent per year compared with 1.7 percent across all banking groups (Deutsche Bundesbank 2008, 2018). At the same time, the share of lending to banks has declined. Despite these slight shifts, there are only a few institutions in the sample that do not fit the overall picture of a strong focus on lending and deposit-taking business with customers.

Figure 2a

Distribution of German cooperative banks customer loans as share of total assets

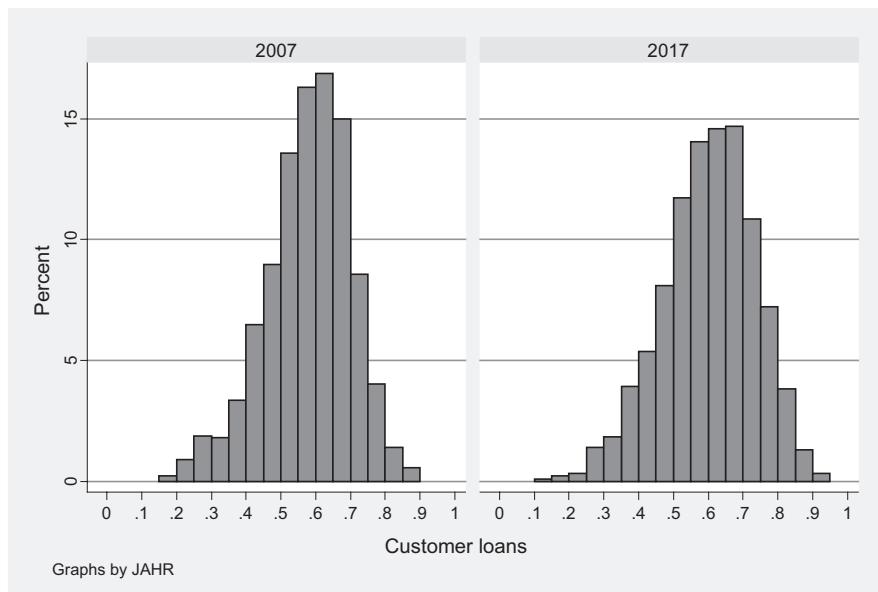
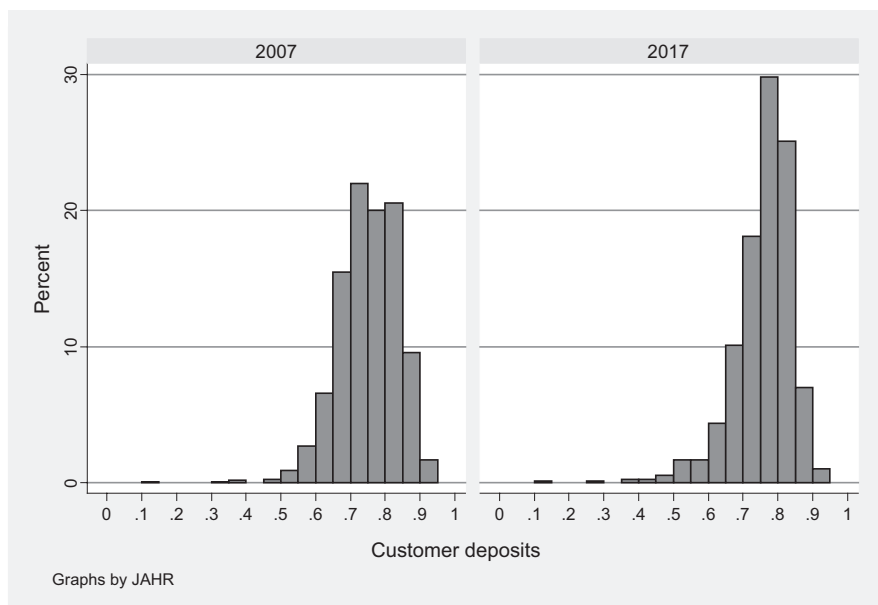


Figure 2b

Distribution of German cooperative banks customer deposits as share of total equity and liabilities



Source: National Association of German Cooperative Banks (BVR).

Table 1

Balance sheet indicators in relation to bank size

Total assets	Customer loans				Customer deposits				Frequency	
Million euro	Mean S. D.				Mean S. D.					
	2007		2017		2007		2017			
< 50	.57	(.13)	.55	(.10)	.80	(.07)	.82	(.06)	96	21
≥ 50 and < 100	.58	(.13)	.61	(.15)	.78	(.08)	.76	(.09)	172	70
≥ 100 and < 250	.58	(.13)	.59	(.14)	.76	(.08)	.76	(.09)	336	200
≥ 250 and < 500	.57	(.12)	.60	(.14)	.74	(.08)	.75	(.10)	299	200
≥ 500 and < 1.000	.59	(.09)	.60	(.13)	.72	(.07)	.75	(.07)	189	169
≥ 1.000 and < 2.500	.58	(.11)	.62	(.10)	.72	(.10)	.75	(.08)	92	185
≥ 2.500	.51	(.18)	.63	(.13)	.73	(.18)	.79	(.08)	31	67
Total	.58	(.12)	.60	(.13)	.75	(.08)	.76	(.08)	1215	912

Total assets	Bank lending				Bank borrowing				Frequency	
Million euro	Mean S. D.				Mean S. D.					
	2007		2017		2007		2017			
< 50	.17	(.10)	.13	(.11)	.10	(.06)	.07	(.05)	96	21
≥ 50 and < 100	.16	(.09)	.08	(.06)	.12	(.07)	.12	(.09)	172	70
≥ 100 and < 250	.15	(.08)	.09	(.08)	.13	(.06)	.12	(.08)	336	200
≥ 250 and < 500	.14	(.08)	.08	(.06)	.12	(.06)	.13	(.08)	299	200
≥ 500 and < 1.000	.13	(.07)	.07	(.05)	.13	(.05)	.13	(.07)	189	169
≥ 1.000 and < 2.500	.13	(.07)	.07	(.05)	.12	(.06)	.14	(.08)	92	185
≥ 2.500	.14	(.07)	.08	(.06)	.13	(.14)	.10	(.07)	31	67
Total	.15	(.08)	.08	(.06)	.12	(.08)	.12	(.07)	1215	912

Source: National Association of German Cooperative Banks (BVR).

Among the ‘outliers’ with particularly low shares of customer deposits or loans are various specialized institutions with special business models. These include, for example, BAG Hamm, which specializes in the workout of sub-performing and non-performing loans and accordingly has only a small proportion of customer deposits on its balance sheet. In contrast, there are some banks with a very high share of deposits whose customer loans represent a below-average proportion of their total assets, due either to their business model or to the regional economic structure.

Among the German cooperative banks, small and medium-sized institutions predominate. In 2017, average total assets (median) amounted to 420 million euros. The arithmetic mean was significantly higher at 948 million euros. The mean value is heavily influenced by the very large institutions and is therefore significantly higher than the median. In terms of total assets, the institutions range in size from 18 million euros (Raiffeisenbank Struvenhütten) to 44 billion euros (Deutsche Apotheker- und Ärztebank).

The obvious question is therefore whether there is a systematic difference in balance sheet structure according to the size of the institution. Table 1 lists the balance sheet indicators for seven bank size classes. This shows that the indicators are largely independent of the size of the institutions.

Table 2

Two business models of cooperative banks in 2017

	Customer loans		Customer deposits		Bank lending		Bank borrowing		Frequency
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	
Cluster 1	.50	(.10)	.81	(.05)	.10	(.07)	.08	(.04)	431
Cluster 2	.70	(.08)	.72	(.09)	.06	(.04)	.17	(.08)	479
Total	.60	(.13)	.76	(.08)	.08	(.60)	.13	(.08)	910

Source: National Association of German Cooperative Banks (BVR).

Significant deviations from the average can only be observed for individual values for the highest and smallest size classes of banks, whereby the 2017 sample for the smallest banks is itself small and must therefore be interpreted with caution. The ongoing merger activities among the cooperative banks and the growth trend of banks’ balance sheets meant there was a noticeable migration of banks toward the higher size classes in the ten-year period under review.

The statistics discussed above highlight the strong focus of all cooperative banks—irrespective of their size—on customer business with loans and deposits. In order to identify different business models within this general trend, the four balance sheet indicators considered can be used in a cluster analysis to search for patterns of similarity between the individual cooperative banks. The following calculations are based on a partition of the sample into a given number of clusters. Guided by the typical number of different business models in other studies, the analyses shown here were carried out for cluster sizes of two to five using a sample from 2017. The selection was based on Calinski-Harabasz statistics (Everitt et al. 2007, 2011) and showed two to be the best number of clusters.

The two clusters are based on the traditional customer-oriented business model and are of similar size, but differ in the quantitative significance of customer deposits and loans (Table 2). Banks in cluster 1 have a very high share of customer deposits (81 percent of total assets) and a below-average share of customer loans (50 percent). Overall, they are therefore more focused on deposit-taking. Due to the high proportion of deposits, borrowing from banks plays a lower than average role in their funding (8 percent). Customer loans are of above-average importance for banks in cluster 2 (70 percent of total assets), which means they are more focused on lending than those in cluster 1. Customer deposits (72 percent) play a lesser role in funding than for banks in cluster 1, with borrowing from other banks being used to a greater extent (17 percent).

Overall, the empirical analysis shows limited diversity among the business models of the cooperative banks. Almost all cooperative banks concentrate on the lending and deposit-taking business with customers. Specialized institutions with special business models are one of the main exceptions, but they have little impact on the overall picture. Within the traditional business model, two different types of business can be identified. In one of these, the banks have a stronger focus on customer deposits on their balance sheets, in the other a balance between customer loans and deposits.

3 Success factors for the cooperative banks

Institutional diversity can make a banking system more robust, provided that certain additional conditions are met. These may include a sufficiently competitive environment and the ability of banks to compete in this environment (which may involve individual institutions exiting the market). Healthy competition is important for the stability of economic systems because it leads to the elimination of inefficiencies and creates incentives for innovation (Page 2011: 214). However, the relationship between competition and stability is likely to be U-shaped, as overly intense competition can increase banks' risk appetite and make it more difficult to build up capital buffers, thereby endangering the stability of the banking system (De Jonghe et al. 2016).

Seen from the industry's perspective, competition in the German banking market has been very intense for a number of years (e.g. Oliver Wyman 2018). The economists view is less clear. The analysis by the German Council of Economic Experts (2013) of market structures in the German banking market, for example, does not include a concrete empirical assessment of the intensity of competition. But the Bundesbank also diagnoses 'intense competition', which it attributes to overcapacity in the banking market, increasing competition with non-banks, and the erosion of interest margins (Deutsche Bundesbank 2013).

3.1 Long-term viability of the business model

The German cooperative banks have thrived in this competitive environment. During the financial crisis, the growth of loans to retail and corporate customers remained stable, but in the period that followed it continuously outstripped the industry trend. The cooperative banks thus helped to ensure that there was no supply-side credit crunch for either retail or corporate customers during the crisis (Deutsche Bundesbank 2010) and prevented the recession from being any deeper. Over the ten-year period from mid-2008 to mid-2018, the cooperative banks steadily increased their market share in lending to both corporate customers (from 12 percent to 18 percent) and retail customers (from 20 percent to 24 percent) (Deutsche Bundesbank 2008, 2018).

3.2 Close market proximity and long-term profitability

The cooperative banks' business model like that of the savings banks, focuses on the traditional banking business with retail and corporate customers within a territory. In contrast to the savings banks, however, cooperative banks do not apply a strict regional principle. This is confirmed by the descriptive statistics and the cluster analysis in section 2. Both of the identified clusters correspond to this business model, one with a slightly greater focus on lending and the other with a slightly greater focus on deposit-taking. In addition, both customer groups are essentially the member base and thus also the owner base. The close proximity between the banks and their customers means the banks are intimately familiar with the market conditions in the region, an essential prerequisite for the success of the cooperative banks. The average proportion of the total assets of all cooperative banks accounted for by corporate and retail loans was 62 percent in mid-2018, while the average figure for all banks was significantly lower at 34 percent.

The earnings performance of the German cooperative banks shows that a focus on traditional banking business can be compatible with long-term profitability, or at least that this was possible in the past. The cooperative banks are now facing major challenges in the current environment of increasing regulation, persistently low interest rates, and ongoing digitalization.

The cooperative banks' solid and less volatile earnings performance compared with the rest of the banking sector is not a recent phenomenon or a product of the financial crisis. It is an expression of their sustained growth and also helps to secure their future viability. In the period between Germany's reunification and the onset of the financial crisis (1990–2007), the return on equity after taxes at the cooperative banks was 6.1 percent, with a standard deviation of 1.7. The average net income for the sector as a whole was slightly lower at 5.7 percent, with significantly higher volatility of 3.4. The above-average profitability of the cooperative banks was thus accompanied by smaller fluctuations in income. In the ten years since the peak of the financial crisis (2008–2017), the return on equity after taxes at the cooperative banks was higher still (8.3 percent) with a standard deviation of 2.6, while the industry average for net income was considerably lower (2.6 percent) with a higher volatility of 4.3. Compared to European banking groups (ECB 2018: 13), the German cooperative banks can be classed as highly profitable.

The enduring economic success of the German cooperative banks is also recognized by the rating agencies. Standard & Poor's and Fitch give the Cooperative Financial Network a very solid AA- rating. In addition to the cooperative banks, the Cooperative Financial Network also includes DZ BANK as the central institution and Bausparkasse Schwäbisch Hall, Union Asset Management Holding, R+V-Versicherung, DZ Hyp, and Münchener Hypothekbank as specialized service providers. The rating combines all relevant assessments in the areas of business model, income, equity, liquidity, and governance structures. The banks are recognized as having a high degree of risk diversification due to the small-ticket nature of the loan receivables.

3.3 Cooperative values and collaboration in network structures

The cooperative banks' purpose is to support their members and is based on the fundamental values of self-reliance, self-management, and self-responsibility. The members of a cooperative bank join together on a voluntary basis, generally within a regional framework. One aspect of the collaboration—and part of the cooperative banks' DNA—is that it does not depend on the support of third parties such as the state. In line with the cooperative values, the banks position themselves as providers of high-quality financial services. For example, the Cooperative Financial Network is striving to provide high-quality investment advice and is plowing large sums into expanding its online presence.

However, collaboration between cooperative banks is not without its challenges. The individual institutions decide on their business policy independently but are closely linked to one another both in terms of their business relationship and through the deposit protection scheme. Economies of scale are more difficult to achieve within the network structure than in a hierarchical organization. However, the autonomy of the individual cooperative banks with their close proximity to the market remains a competitive advantage and success factor.

3.4 Risk management

Risk management plays a crucial role in ensuring the stability of the individual cooperative banks and the Cooperative Financial Network as a whole. The primary function of risk management is to correctly identify and manage risks at the level of the individual institutions. The quality of risk management is monitored by the auditing associations as part of the annual audit of the member institutions.

Beyond the banks' own individual risk management policies, the stability of the entire Cooperative Financial Network is underpinned by the protection scheme operated by the BVR (BVR 2018). The protection scheme is a central plank of the solidarity-based system of the cooperative institutions and has always guaranteed the solvency and liquidity of the affiliated banks since it was set up more than 80 years ago. The work of this scheme is strongly focused on prevention, i.e. on identifying difficulties faced by individual member institutions at an early stage and taking action to overcome them.

The strong capitalization of the cooperative banks is also an important element of risk management. On a consolidated basis, the Cooperative Financial Network's regulatory total capital ratio stood at 16.0 percent at the end of 2017 (BVR 2018). The above-average capital adequacy is reflected in a leverage ratio of 7.7 percent (including reserves under section 340f of the German Commercial Code (HGB)) and absolute equity of 104.4 billion euros.

4 Conclusion

The institutional diversity in the German banking industry is not limited to the three-pillar structure of private banks, savings banks, and cooperative banks, but also extends to the diversity within the pillars themselves. The cluster analysis based on balance sheet indicators described above illustrates the differences between the business models of Germany's cooperative banks, but at the same time also shows the clear focus on the traditional deposit-taking and lending business with retail and corporate customers.

Structural diversity enhances stability and, for this reason, economic policy and banking regulation in particular should seek to preserve and strengthen it. What can policymakers do to maintain robust structural diversity in the banking sector? The theory of complex systems suggests a cautious approach is called for: "We would be naive to believe that we can anticipate the systems level effects of artificially changing [levels of variation, amounts of diversity, and the heterogeneity of group composition] by pulling levers. But we would be equally naive to take a laissez faire approach to complex systems" (Page 2011: 254).

This means, first and foremost, that a structural policy that consciously promotes structural diversity is not the way to ensure a stable banking sector. Market competition should essentially determine which business models prevail. This must also include the possibility of individual banks exiting the market, even if they are large or systemically important in some other way.

But the lawmakers should not be completely passive either. The principle of proportionality plays a decisive role, particularly in the area of banking regulation. This states that both the requirements made of a bank's management instruments and the intensity of supervision by the banking supervisory authority should be proportionate to the risks assumed by the bank. There is clear evidence that the current system of banking regulation seriously violates this principle (e.g. Hackethal et al. 2015), thus distorting competition to the detriment of smaller credit institutions. Legislative measures are needed to eliminate such disadvantages and create a level playing field. At the same time, lawmakers should be guided by the first principle of medical ethics—'Do no harm!'—both to avoid further disadvantages for smaller institutions and with a view to preserving the structural diversity of the banking sector.

References

- Ayadi, Ram, E. Arbak and Willem de Groen (2011): Business Models in European Banking: A pre- and post-crisis screening. Centre for European Policy Studies (CEPS), Brussels.
- Ayadi, Rym, and Willem de Groen (2014): Banking Business Models Monitor 2014: Europe. Centre for European Policy Studies (CEPS), Brussels.
- Ayadi, Rym, Willem de Groen, Ibtihel Sassi, Walid Mathlouthi, Harol Rey and Olivier Aubry (2015): Banking Business Models Monitor 2015: Europe. HEC Montreal.
- Ayadi, Rym, David T. Llewellyn and Reinhard H. Schmidt (2010): Investigating Diversity in the Banking Sector in Europe. Key Developments, Performance and Role of Cooperative Banks. CEPS.
- Ayadi, Rym, Reinhard H. Schmidt and Santiago Carbó Valverde (2009): Investigating Diversity in the Banking Sector in Europe. The Performance and Role of Savings Banks. CEPS.
- Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e. V. (BVR)/National Association of German Cooperative Banks (BVR) (2018): Consolidated Financial Statements 2017 of the Volksbanken Raiffeisenbanken. Cooperative Financial Network.
- De Jonghe, Olivier, Maaïke Diepstraten and Glenn Schepens (2016): Competition in EU-Banking. In: Thorsten Beck and Barbara Casu (eds.): *The Palgrave Handbook of European Banking*. London, Palgrave, 187–211.
- Deutsche Bundesbank (2008, 2018): Banking Statistics, February.
- Deutsche Bundesbank (2010): Germany in the financial and economic crisis—Monthly Report, October.
- Deutsche Bundesbank (2013): Financial Stability Review 2013, November.
- European Central Bank (2018): SSM thematic review on profitability and business models, September.
- Everitt, Brian S., Sabine Landau, Morven Leese and Daniel Stahl (2011): *Cluster Analysis*. 5th Edition. John Wiley & Sons.
- Everitt, Brian, and Sophia Rabe-Hesketh (2007): *A Handbook of Statistical Analysis Using Stata*, 4th Edition.
- Farné, Matteo, and Angelos Vouldis (2017): Business Models of the Banks in the Euro Area. Working Paper Series No 2070, May. European Central Bank.
- German Council of Economic Experts (SVR) (2013): Annual Review 2013/14.
- Hackethal, Andreas, and Roman Inderst (2015): Auswirkungen der Regulatorik auf kleinere und mittlere Banken am Beispiel der deutschen Genossenschaftsbanken. Report commissioned by the National Association of German Cooperative Banks (BVR).
- Hofmann, Gerhard (2013): Kreditgenossenschaften – Stabilitätsanker in der Finanz- und Staatsschuldenkrise. *Zeitschrift für das gesamte Genossenschaftswesen*, 63 (2).
- May, Robert M, Simon A. Levin and George Sugihara (2008): Ecology for bankers. *Nature*, 451, February.
- National Association of German Cooperative Banks (BVR) (2018): Consolidated Financial Statements 2017 of the Volksbanken Raiffeisenbanken. Cooperative Financial Network.
- Oliver Wyman Unternehmensberatung (2018): Bankenreport 2018. Noch da? Wie man zu den 150 deutschen Banken gehört.
- Page, Scott E. (2011): *Diversity and Complexity*. Princeton, Princeton University Press.
- Peters, Hans-Walter (2016): Vielfalt an Instituten tut dem deutschen Finanzmarkt gut. guest contribution to the *Börsen-Zeitung*, November 10.

- Roengpitya, Rungporn, Nikola Tarashev and Kostas Tsataronis (2014): Bank Business Models. Quarterly Review, December 2014. Bank for International Settlements (BIS).
- Schmidt, Reinhard H. (2011): Ein Plädoyer für die Bankenvielfalt. Frankfurter Allgemeine Zeitung, May 27, 25.
- Schmidt, Reinhard H., and Patrick Behr (2016): The German Banking System In: Thorsten Beck and Barbara Casu (eds.): The Palgrave Handbook of European Banking. London, Palgrave, 541–566.