Diversity across EU banking sectors: Poorly researched and underappreciated

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Summary: Interest in the role of diversity in banking sectors has increased substantially since the financial crisis (and the subsequent sovereign debt crises) have hit European countries differentially. The purpose of this note is to hint at crucial research gaps in terms of appreciating consequences of this variety. In preparation for this, we take stock of the across country diversity of banking sectors in the European Union before and after the financial crisis. Key issues in a future research agenda for evaluating diversity in the banking sector (and the financial sector more generally) have to do with: (a) defining the concept's empirical meaning and hence its measurable properties, (b) the relationship between diversity and the level of competition (market power) in the banking sector, (c) the link between diversity and banking sector stability, (d) the pertinence of banking sector diversity for mitigating access to finance problems, in particular for SMEs and (e) the interlinkages between diversity in the banking (financial) sector and non-financial, "real" economy diversity ("goodness of fit"-issue, institutional embededdness). Filling the indicated research gaps would be an important contribution to both the debate on deeper integration of Europe's financial markets (Banking Union, Capital Markets Union) as well as the debate on a sustainable financial architecture, being at the same time conducive to innovation and growth whilst protecting society effectively from large-scale financial crises.

Zusammenfassung: Das Interesse an der Rolle der Vielfalt im Bankensektor hat erheblich zugenommen, seit die Finanzkrise (und die anschließenden Staatsschuldenkrisen) die europäischen Länder in unterschiedlicher Weise getroffen haben. In diesem Überblicksartikel werden entscheidende Forschungslücken im Bereich der Vielfalt im Bankensektor herausgearbeitet. Vorbereitend dazu bilanzieren wir die Vielfalt der Bankensektoren in der Europäischen Union und beleuchten die Unterschiede vor und nach der Finanzkrise. Kernpunkte einer künftigen Forschungsagenda zur Bewertung der Diversität im Bankensektor (und im Finanzsektor im Allgemeinen) sind: (a) die Definition der empirischen Bedeutung des Konzepts und damit seiner messbaren Eigenschaften, (b) die Beziehung zwischen Diversität und Wettbewerbsniveau (Marktmacht) im Bankensektor, (c) die Verbindung zwischen Diversität und Stabilität des Bankensektors, (d) die Relevanz der Diversität im Bankensektor

→ JEL classification: G01, G20, G21, G28
→ Keywords: Diversity, banking sector structure, sector stability, SME, financial constraints

DOI https://doi.org/10.3790/vjh.87.4.153

für einen erleichterten Zugang zu Finanzierung, insbesondere für KMU, und (e) die Verknüpfungen zwischen Diversität im Bankensektor (Finanzsektor) und nichtfinanzieller, „realer" wirtschaftlicher Diversität („Goodness of fit"-Problematik, institutionelle Einbettung). Die aufgezeigten Forschungslücken zu schließen, wäre ein wichtiger Beitrag sowohl zur Debatte über eine tiefere Integration der europäischen Finanzmärkte (Bankenunion, Kapitalmarktunion) als auch zur Debatte über eine nachhaltige Finanzarchitektur, die gleichzeitig Innovation und Wachstum fördert und die Gesellschaft wirksam vor großen Finanzkrisen schützt.

1 Diversity within and across banking sectors—what does it mean?

Diversity over functional characteristics often comes with positive connotations. Ecologists, for example, were convinced for a long time that variety, allowing for a richer set of responses to shocks or new challenges, implies stability: "*Simple communities are more easily upset than [...] richer ones; that is, more subject to destructive oscillations in populations, and more vulnerable to invasions*" (Elton 1958). What regards financial assets, we are well-advised not to put all our eggs into one basket, i. e. instead increase our exposure to a variety of income streams, at least up to a point. This is, of course, a staple of the literature on portfolio management. As Markovitz, Tobin, Sharpe and others have demonstrated, portfolio robustness comes from diversification. Exploiting less than perfect correlation across financial claims allows investors to reduce shortfall risks, given an expected return (efficiency frontier). Investors following this approach do not pretend to know, they just choose the market portfolio. And they express their "behavior towards risk" in the share of the portfolio which is allocated to the risk-free asset. Obviously, exposing oneself to a specific risk could be more profitable. But this would come with substantially higher uncertainty, in particular increasing the probability of really bad outcomes. On average, taking idiosyncratic risk is not rewarded (Markovitz 1952, Tobin 1957).

Of course, diversity is not necessarily beneficial. It can contribute positively to goal achievement, as just illustrated. At the same time, heterogeneity can also be the source of problems, for example, contribute to social tensions and undermine societal capital (Alesina, Guiliano 2015, Putnam 1993). Thus, diversity can be positive, allow for better problem solving, as well as negative, i. e. undermine trust (e. g. Page 2014).

To be brief: In ecology, bio-diversity seemingly promises resilience (see also Schmidt in this issue). Seemingly only, since the claim of a positive association between diversity and dynamic stability is contested (see McCann 2000 and Tilmann 1999). Of course, this is reasoning by analogy (or in metaphors). Still, it can hint at essential features, being usefuly in a 'transdisciplinary' way (Page 2014). Closer to home, in finance, the Markovitz-Tobin-Sharpe diversification paradigm promises insurance against idiosyncratic (as opposed to systematic) risks. Providing insurance against substantial losses and the capacity to absorb shocks are also essential characteristics of a sound banking system. Given the enormous societal costs emanating from banking—or financial institution—crises, it is therefore worth pursuing the question whether a more diverse set of financial institutions rhymes with "sound banking", contributing to the resilience of the European banking landscape.

This is clearly not a moot issue: Up until the Great Financial Crisis, somehow along the lines of the Hansmann-Kraakman (2000) "end of history" argument (concerning corporate governance, Kotz 2007), a view became dominant according to which only privately owned, publicly traded

DOI https://doi.org/10.3790/vjh.87.4.153

and shareholder-value maximizing banks could deliver. Conversely, cooperative and in particular public sector savings banks were diagnosed as fraught with incentive conflictsand are, as a consequence, structurally underperforming and hence doomed. They could not muster the capacities to run large-scale, (ex-ante seemingly) highly profitable structured credit business lines. Of course, the GFC has led to a reappraisal: Meanwhile, "boring banking", i. e. more risk-averse and with much less ambitious RoE-targets, did measure up rather positively with the former champions. In fact, evidence was brought to bear documenting that banks with the 'best' corporate governance (according to the formerly dominant template) performed worst (Beltratti and Stultz 2011, Kotz and Schmidt 2017)

In this line of reasoning—which, of course, has a longstanding pedigree—, the European Parliament stated that "*the diversity of legal models and business objectives of the financial entities in the retail banking sector (banks, savings banks, cooperatives, etc.) is a fundamental asset to the EU's economy which enriches the sector, corresponds to the pluralist structure of the market and helps to increase competition in the internal market* [...]". This was not, to be sure, a dominating position (including in the EP) before the GFC. Nonetheless, against this backdrop one could have expected that research on the costs and benefits of banking sector diversity would have been intensified. Surprisingly, however, this was not the case. Still, Ayadi, Llewellyn, Schmidt, Arbak and de Groen (2009) and (2010) published, shortly after the Lehman-AIG etc. debacle, are two pioneering studies on the importance of banking sector diversity for economic stability (and allocational efficiency). However, by and large, the research about which institutional structure of the financial system serves the economy best kept focusing on the simple dichotomy between market- and bank-based financial systems (e. g. Langfield and Pagano 2016).

Yet, this binary perspective has been too simplistic for a long time. In fact, links—the deep interconnectedness—between banks and (anonymous) capital, money and derivatives markets have been too close to ignore for at least since the mid-1980s. To give just two examples: Banks, in particular the large ones, have been "buying" deposits in interbank wholesale markets for decades (instead of collecting retail deposits). Hence, at the margin, their funding costs were determined by demand and supply. Moreover, pricing of loans, that is, the assessment of credit risks, at least as what concerns corporate loans, was also closely following market-determined swap rates plus a risk premium.

Debates in the policy domain where much more in line with contemporaneous developments in the financial sphere: There, industrial diversity in general and banking sector diversity in particular gained in salience in particular in the wake of the GFC. Arnout W. Boot, for example, emphasized the pertinence of diversity when commenting upon the performance of Dutch banks in the 2014 stress test of the European Banking Authority: "*The Netherlands offers a perfect example of how not to do it. Before the crisis, the large financial institutions were becoming to look like each other and were taking comparable risks, and when the crisis hit, they were damaged in the same way*. [...] *Greater diversity is desirable to prevent one bank from exacerbating the problems of another* [...]" (cited in De Nederlandsche Bank (2015: 22).[1] Very recently, the EU commission also emphasized the importance of diversity in the economy in general. Margrethe Vestager, at the time commissioner for

1 The original article is written in Dutch (Boot 2014).

competition, argued "that diverse collection of businesses like a healthy, varied ecosystem in the natural world—can help to keep our economy strong and resilient" (Vestager 2018).[2]

Despite such statements, ten years after Lehman's bankruptcy, empirical work on how banking (and financial) sector diversity affects competition, bank stability, the financing of the real economy, and, in particular, the funding of small and medium-sized enterprises (SMEs) is still rather scarce. However, filling this research gap is crucial. On the one hand, important regulatory initiatives that do impact sector diversity have already been implemented (think of the series of directives and regulations for financial markets conceived as response to the two crises) or are waiting for realization and implementation. First, also based on the observation that European firms and households are (compared to the U.S.) too bank-dependent, the European Commission launched in 2014 the Capital Markets Union initiative. However, the CMU program, striving for de-segmentation through more homogeneity and standardization, largely disregards effects of banking sector diversity for, inter alia, regional economic prospects. Second, it has long been ignored that EU-bank regulation, introduced to protect society from the devastating consequences from a failure of a systemically-important, large bank, may have unintended side effects on banking sector diversity and, via this channel, on particular social and political goals (see also Ferri and Neuberger in this issue).

To reiterate: Banking sector diversity is under-researched. At the same time, the issue of whether institutional diversity is a societal asset or a public good has become more topical. A number of European banking systems, and here the plural is apposite, still struggle to gain stability. In some (national) markets a significant roster of banks, not earning their cost of capital, are palpably not viable on current trajectories. At the same time, some (national) markets, with only a few, dominant players, are doing better. Taking these cases as a template therefore leads some to conclude that consolidation should be pursued (see Bini Smaghi in this issue), if feasible, on a European scale. Should one expect a more robust financial system from such a development?

In the remainder of this note we ponder two issues. First, we take stock of developments in European banking sectors in the post-Lehman years, sketching the trajectory of key aggregate indicators. Here we try to assess whether EU banking sectors have become more diverse or whether, conversely, homogeneity has risen. Subsequently, we explore how to capture (measure) banking sector diversity and we also briefly review the most important research areas revolving around institutional diversity in the EU banking sectors.

2 Banking sector diversity within the EU: Increasing in the wake of the crises?

What do key country-level (macro) indicators tell us about diversity between EU banking sectors, that is: across the different national banking markets? Can we uncover differences over time, between pre- and post the financial crisis? To throw some light on this, we use the World Bank's Global Financial Development Database (GFDD). As indicators (or dimensions) of diversity we

2 Dimon (2016) emphasizes the complementarity of large and small banks.

DOI https://doi.org/10.3790/vjh.87.4.153

take differences in size (relative to GDP), concentration, competition and stability across national markets as well as compare their pre- and post-crisis levels.

2.1 The relative size of banking sectors has decreased in many EU countries

Table 1 reports commercial banks' (i. e. deposit-taking and lending institutions') assets relative to GDP in 2007 and 2016. In the wake of the GFC, banking sectors in Cyprus, Ireland, United Kingdom, Spain and Germany shrank the most in relative terms. In contrast, Italy and Greece and Poland even experienced increases relative to their GDPs. The unweighted mean across the banking markets included went down between 2007 and 2016. Banks shrank their balance sheets, i. e. deleveraged, also to meet higher capital requirements (relative to their risk-weighted assets). Thus, when accounting for the standard deviation of intermediation ratios between 2016 and 2007, national banking systems have become more similar. At the same time, in 2016 aggregated bank assets were higher than the GDP in 13 EU countries.

Table 1

Deposit banks' assets relative to GDP

Country	2007	2016	Change	Country	2007	2016	Change
Denmark	194.1	179.0	–15.1	Croatia	69.2	88.8	19.6
Spain	166.1	139.8	–26.3	Belgium	87.3	81.9	–5.4
Portugal	139.8	134.5	–5.3	Estonia	74.8	72.5	–2.4
Sweden	115.7	132.4	16.7	Poland	44.9	70.4	25.6
United Kingdom	158.3	130.5	–27.8	Slovak Republic	47.4	67.7	20.3
Netherlands	121.4	127.0	5.6	Slovenia	70.3	65.3	–4.9
Italy	96.0	124.7	28.7	Czech Republic	51.1	63.7	12.5
Greece	93.8	122.4	28.6	Bulgaria	52.0	62.9	11.0
France	100.3	112.5	12.1	Ireland	148.7	56.1	–92.6
Luxembourg	81.6	105.3	23.7	Hungary	69.7	55.1	–14.6
Malta	125.7	102.8	–22.9	Latvia	73.7	51.6	–22.2
Finland	76.1	101.8	25.7	Lithuania	53.0	46.9	–6.2
Austria	102.8	100.4	–2.4	Romania	28.4	39.8	11.4
Germany	117.6	93.4	–24.2	Cyprus	187.0	18.0	–169.0
Country average	98.1	91.0					
Standard deviation	44.2	37.2					

Source: Global Financial Development Database (GFDD), Worldbank (2017). Own calculations, the minus sign indicates a decrease in the country's deposit banks' assets relative to GDP.

2.2 Concentration has increased in most EU banking sectors subsequently to the GFC

Table 2 shows, for each EU member state, the concentration of bank assets, measured by the share of the five and three largest banks (CR5 and CR3-bank asset concentration). In 2016, Greece

Table 2

Asset share of the five largest banks in the domestic bank sector

	Asset share of the five largest banks in the domestic banking sector (5-bank asset concentration) (%)			Asset share of the three largest banks in the domestic banking sector (3-bank asset concentration) (%)		
Country	2007	2016	Change 2007–2016	2007	2016	Change 2007–2016
	(2)	(3)	(4)	(5)	(6)	(7)
Greece	81	100	19	60	77	17
Lithuania	88	99	11	73	88	15
Malta	100	98	–2	91	91	1
Estonia	99	96	–3	93	75	–18
Sweden	98	95	–4	97	92	–5
Denmark	88	94	7	81	87	6
Netherlands	94	91	–3	90	85	–5
Slovak Republic	80	90	9	63	75	12
Cyprus	90	89	–1	70	75	5
Portugal	88	87	–1	83	81	–2
Ireland	83	86	3	65	66	2
Hungary	69	86	17	48	67	18
Belgium	96	86	–10	83	64	–19
Finland	100	83	–16	98	70	–28
Spain	79	81	2	67	62	–5
Czech Republic	79	79	0	66	60	–6
Slovenia	69	78	9	57	60	2
Latvia	74	78	4	58	53	–5
Bulgaria	69	77	9	49	56	7
Germany	85	77	–8	72	67	–5
Romania	68	76	8	56	59	4
Croatia	73	75	3	53	60	7
France	74	74	0	61	58	–3
Austria	84	72	–12	78	55	–23
Italy	55	71	16	45	59	14
United Kingdom	77	70	–6	60	51	–9
Poland	57	57	1	42	40	–1
Luxembourg	42	43	1	31	32	1
Country average	80	82		67.5	66.6	
Standard deviation	14	13		17	15	

Source: Global Financial Development Database (GFDD), Worldbank (2017). Own calculations, in column (4) and (7) the minus sign indicates a decrease in the degree of concentration.

(CR5) and Sweden (CR3) had the highest concentration levels of all EU countries. During the crisis years, on this metric, EU banking sectors obviously moved into different directions. In some countries, banking sectors have become more concentrated, while in others concentration

has strongly decreased (Column (4) and (7)). Particularly substantial changes are observable in Finland (decrease of 16 percent and 28 percent, respectively) and in Greece (increase of 19 and 17 percent, respectively). On average, CR5-bank asset concentration has grown while CR3-bank asset concentration has remained constant since the start of the crisis.

However, cross-country differences in concentration have become smaller over the crisis period. More specifically, the standard deviation of asset concentration across countries has decreased by 1 percentage point (CR5) and 2 percentage points (CR3), respectively. In other words, on this metric EU-banking sectors have become (slightly) more similar.

2.3 Competitive environment: Banks gained market power

Table 3, documenting the evolution of the Lerner index, gauges the aggregate price setting (market) power in European Union banking sectors. The Lerner index is defined as markup divided by the price of the product:[3]

$$Lerner\ index = \frac{\text{Price} - \text{Marginal Cost}}{\text{Price}}.$$

Capturing the proportional difference between monopoly and competitive prices, higher values indicate a higher average price setting power in the respective country, possibly as a result of a lower degree of competition (Beck, Jonghe and Schepens 2013), from other banks or from non-bank banks ('shadow banks') or other financial service providers such as Fintechs. On average, Banks in Latvia enjoyed the highest market power in 2014, followed by Sweden and the Czech Republic. Germany and Finland rank at the bottom, implying that in those countries competition among banks is high and markups are commensurately small. Latvian banks experienced the highest increase in market power over the crisis years (Column 4). On average, the price setting power in banking sectors has risen by 17 percent between 2007 and 2014. Even in the lowest ranking countries, Germany and Finland, the Lerner Index is meanwhile higher than it was in 2007. Surprisingly, at the country level, UK banks lost the most market power in this period. The standard deviation of the country-level Lerner Index has only slightly increased, indicating that the across-country diversity remained broadly unchanged.

Boone (2008) developed an indicator to capture competitive intensity by measuring the response of profits to a change in marginal costs (Table 4). The underlying drivers could be lower barriers to entry or a more aggressive conduct of competitors. Regressing the log of profits on marginal costs one obtains a coefficient for the profit elasticity:[4] The Boone-coefficient measures the percentage fall in profits in response to an increase in marginal costs. A negative value indicates that a decrease in marginal costs, obtained by more efficient banks, causes a redistribution of profits

3 The price is usually proxied by the total bank revenue over assets and the marginal costs are obtained from an estimated translog cost function with respect to output (e. g. Beck et al 2013). In the GFDD the individual banks' Lerner values, calculated from underlying bank-by-bank data from Bankscope, are aggregated to obtain the country-level Lerner Index (Demirgüç-Kunt and Martínez Pería 2010), www.worldbank.org/en/publication/gfdr/data/global-financial-development-database.

4 The Boone Indicator in the GFDD is calculated from underlying bank-by-bank data from Bankscope: "To obtain the elasticity, the log of profits (measured by return on assets) is regressed on the log of marginal costs. The estimated coefficient (computed from the first derivative of a trans-log cost function) is the elasticity. Estimations of the Boone indicator in the GFDD database follow the methodology used by Schaeck and Cihák (2010)."

Table 3

Lerner Index–country level

Country Name	2007	2014	Difference	Country Name	2007	2014	Difference
	(2)	(3)	(4)		(5)	(6)	(7)
Latvia	0,265	0,445	0,181	United Kingdom	0,439	0,276	–0,163
Sweden	0,279	0,412	0,133	Ireland*	0,223	0,268	0,045
Czech Republic	0,317	0,400	0,083	Luxembourg	0,114	0,261	0,147
Lithuania	0,324	0,377	0,052	Estonia*	0,289	0,236	–0,053
Malta*	0,227	0,371	0,144	Slovenia	0,215	0,234	0,019
Bulgaria	0,341	0,368	0,028	Belgium	0,075	0,211	0,136
Cyprus	0,295	0,355	0,060	Greece*	0,231	0,209	–0,022
Poland	0,295	0,348	0,052	Hungary	0,256	0,192	–0,064
Slovak Republic	0,247	0,345	0,099	Netherlands	0,218	0,174	–0,044
Denmark	0,196	0,326	0,131	Italy	0,059	0,136	0,077
Spain	0,273	0,322	0,050	France	0,058	0,132	0,074
Portugal*	0,368	0,307	–0,061	Romania	0,236	0,122	–0,114
Croatia	0,262	0,292	0,030	Finland*	0,078	0,092	0,015
Austria	0,241	0,288	0,048	Germany	0,047	0,085	0,038
Country average	0.231	0.277					
Standard deviation	0.099	0.104					

*The most recent Lerner Index of Estonia, Greece, Finland, Ireland and Malta is from 2010, that of Portugal from 2013.
Source: Global Financial Development Database (GFDD), Worldbank (2017), own calculations. Most recent data are from 2014. In column (4) and (7) the minus sign indicates a decrease in the Lerner index between 2007 and 2014.

from less to more efficient banks and hence an increase in their profits. Since competition forces banks to increase efficiency, the Boone Indicator is an alternative to the Lerner Index.[5] The more negative the Boone Indicator is, the stronger is the reallocation effect, and hence the higher is the inferred level of competition.

Table 4 shows that the Boone Indicator has increased on average over the crisis years. The mean is higher in 2014 than it was in 2007, also the differences between 2007 and 2014 values are often positive. In 2014, Slovenia, Ireland, Bulgaria, Netherlands, Finland, Greece and Italy had the highest Boone Indicators, implying comparatively low levels of competition in their banking sectors. In contrast, Luxembourg, Portugal, Spain, Latvia and Malta have the most competitive banking sectors (the lowest value of the Boone indicator). Interestingly, the standard deviation substantially decreased, indicating that banking sectors emerged from the acute crisis more similar than they were at the start. This result contrasts with the findings from the Lerner Index. Although both

5 Whereas the Lerner Index relies on market structure in representing the degree of competition, the Boone Index also accounts for the degree of market contestability or barriers to entry. Of course, metrics of market structure (concentration ratios) are only indirect proxies of competition, claiming a one-way causality between structure and performance. Hence, they do not allow for the fact that concentration ratios are the upshot of competitive behavior. The Boone Index (and similar approaches like the Panzar Rosse metric) are not vulnerable to this critique (see Degryse, Kim and Ongena 2009).

DOI https://doi.org/10.3790/vjh.87.4.153

Table 4

Boone Indicator

Country	2007	2014	Difference	Country	2007	2014	Difference
Luxembourg	–70.892	–50.060	20.831	Austria	–0.023	–0.023	0.000
Portugal	–0.663	–1.028	–0.365	Belgium	–0.078	–0.021	0.057
Spain	–0.751	–0.606	0.145	Slovak Republic	–0.019	–0.006	0.013
Latvia	–0.208	–0.155	0.054	Cyprus	–0.084	–0.005	0.080
Malta	–0.192	–0.127	0.066	Romania	–0.126	–0.003	0.123
Hungary	–0.165	–0.096	0.069	France	–0.035	–0.001	0.034
Estonia	–0.171	–0.095	0.075	Lithuania	–0.054	0.000	0.054
Poland	–0.114	–0.079	0.035	Italy	–0.048	0.002	0.050
Denmark	–0.159	–0.070	0.089	Greece	–0.108	0.003	0.110
Czech Republic	–0.110	–0.069	0.042	Finland	0.117	0.090	–0.027
Croatia	–0.142	–0.050	0.092	Netherlands	–0.080	0.132	0.212
Sweden	–0.086	–0.048	0.037	Bulgaria	–0.096	0.214	0.310
United Kingdom	–0.111	–0.047	0.064	Ireland	2.814	0.654	–2.159
Germany	–0.043	–0.028	0.016	Slovenia	5.007	11.345	6.338
Country average	–2.38	–1.43					
Standard deviation	13.47	9.77					

Source: Global Financial Development Database (GFDD), Worldbank (2017), own calculations. Most recent data are from 2014.

competition indicators reveal on average a decrease of competitive intensity over the crisis years, Table 2 and 3 tell quite different messages. For example, considering the Lerner Index, The Netherlands rank in the last quarter of countries, indicating a high competition intensity. In contrast, the Boone Indicator value of the country is the 4th highest among all EU countries, indicating very low competition intensity. Similarly, according to the Boone Indicator the level of competition in Finland's banking sector is rather low (high value of the Boone indicator) but is rather high if the Lerner Index is used (low level of the Lerner Index).

What might explain the contrasting evidence between the two indicators? Both, the Lerner Index and the Boone Indicator, measure competition only indirectly. The Lerner Index focusses on the banks' market power to set high prices for their products. In contrast, the Boone Indicator emphasizes banks' capacity to lower marginal costs. Competition is a training program for the latter but has a negative influence on the first. Accordingly, the assessment of the level of competition in a country can vary quite substantially depending on what indicator is considered.

2.4 Capital to assets ratios have increased in most EU banking sectors

The ratio of bank capital to total assets captures capital buffers available for covering potential losses, and is, therefore, an indicator of stability (Table 5).[6] According to this ratio, Sweden, Italy, Finland, Netherland and France had the lowest capacity to cushion shocks to their banking sectors in 2016. Their *capital to assets ratios*, aggregated over all domestic banks, were below 6 percent. On the other end of the scale are Irish and Croatian banks, they held the highest capital buffers. The Irish banking sector has experienced the largest growth of the capital buffer since the crisis (adding 8.9 percentage points). Decreases of capital buffers in the wake of the crisis are very rare. Only the banking sectors of Italy, Sweden, Finland, Hungary and Slovenia had a lower *capital to assets*

Table 5

Bank capital to total assets

Country	2007	2016	Difference	Country	2007	2016	Difference
	(1)	(2)	(3)		(4)	(5)	(6)
Sweden	4.8	4.4	–0.4	Hungary	10.7	8,2	–2.5
Italy	7,9	5,5	–2,4	Slovenia	8,4	8,2	–0,2
Finland	8,0	5,6	–2,4	Portugal	6,5	8,4	1,9
Netherlands	3,3	5,7	2,4	Romania	n.a.	8,9	––
France	4,1	5,7	1,6	Poland	8,0	9,5	1,5
Germany	4,3	6,0	1,7	Latvia	7,9	10,0	2,1
Belgium	4,1	6,9	2,8	Lithuania	7,9	10,4	2,5
United Kingdom	5,5	7,0	1,5	Cyprus	n.a.	10,4	––
Czech Republic	5,7	7,3	1,6	Greece	6,8	10,7	3,9
Austria	6,5	7,3	0,8	Estonia	8,6	10,8	2,2
Luxembourg	5,0	7,4	2,4	Slovak Republic	8,0	11,0	3,0
Denmark	6,2	7,4	1,2	Bulgaria	7,7	11,6	3,9
Malta	6,0	7,5	1,5	Ireland	4,6	13,5	8,9
Spain	6,7	7,8	1,1	Croatia	12,4	14,0	1,6
Country average	6,6	8,7					
Standard deviation	2	2,4					

Source: Global Financial Development Database (GFDD) of the Worldbank. Own calculations. Most recent data are from 2016.

6 Capital is defined very broadly and goes beyond the Common Equity Tier 1 and Retained Earnings which is used in the EBA stress tests for indicating a bank's capability for loss absorption. In the GFDD data, the "Ratio of bank capital and reserves to total assets" has the following ingredients: "Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Capital includes tier 1 capital (paid-up shares and common stock), which is a common feature in all countries' banking systems, and total regulatory capital, which includes several specified types of subordinated debt instruments that need not be repaid if the funds are required to maintain minimum capital levels (these comprise tier 2 and tier 3 capital). Total assets include all nonfinancial and financial assets. Reported by IMF staff. Note that due to differences in national accounting, taxation, and supervisory regimes, these data are not strictly comparable across countries." https://data.worldbank.org/indicator/FB.BNK.CAPA.ZS.

ratio in 2016 than in 2007. Among those with lower capital buffers, Italian and Swedish banks lost over two percentage points in the aggregate. According to this metric, banking sectors differ slightly more in 2016 than in 2007. The standard deviation of *capital to assets ratios* has grown from around 2 percent in 2007 to 2.4 percent in 2016.

2.5 *Z-scores* have increased in most EU banking sectors over the crisis years

The *Z-score* is a standard measure of distance to default, i. e. for gauging bank soundness (Schaeck and Chihák 2010). It reflects how many standard deviations the return on assets (ROA) has to fall until a bank's equity buffers are depleted:

$$Z-score = \frac{\text{Return on Assets} + \text{Equity over Assets}}{\text{Standard Deviation of Return on Assets}}.$$

Accordingly, a higher *Z-score* is associated with higher resilience.[7] The GFDD presents a country-level variant of the Z-score. Table 6 indicates that the average Z-score has increased substantially between 2007 and 2016. Also, the variation in the resilience levels of EU banking sectors, mea-

Table 6

Z-score

Country	2007	2016	Difference	Country	2007	2016	Difference
	(1)	(2)	(3)		(4)	(5)	(6)
Luxembourg	25.63	46.95	21.32	Ireland	3.40	12.34	8.94
Austria	27.92	25.67	–2.24	Cyprus	9.24	11.89	2.65
Germany	15.99	24.17	8.18	Netherlands	11.68	11.30	–0.38
Spain	17.57	22.83	5.27	Italy	15.43	10.03	–5.40
Denmark	15.45	21.88	6.44	Poland	8.67	8.47	–0.19
France	13.52	21.24	7.72	Bulgaria	7.48	8.38	0.90
Malta	27.01	20.84	–6.17	Hungary	5.87	8.04	2.17
Belgium	10.54	17.45	6.91	Latvia	5.76	7.33	1.57
Slovak Republic	13.87	17.38	3.51	Greece	4.99	6.96	1.97
Portugal*	14.43	15.54	1.10	Lithuania	5.40	6.50	1.10
Finland	16.45	15.11	–1.33	Estonia	4.25	6.46	2.21
Sweden	9.05	14.63	5.58	Romania	5.30	6.46	1.16
Czech Republic	9.97	13.93	3.96	Croatia	4.76	5.30	0.55
United Kingdom	6.32	12.53	6.21	Slovenia	2.61	4.06	1.45
Country average	11. 4	14.4					
Standard deviation	7.02	9.10					

Source: Global Financial Development Database (GFDD) of the Worldbank, own calculations. Most recent data are from 2016. Portugal's most recent data is from 2014.

7 *"It captures the probability of default of a country's banking system. Z-score compares the buffer of a country's banking system (capitalization and returns) with the volatility of those returns.* [...] *ROA, equity, and assets are country-level aggregate figures calculated from underlying bank-by-bank unconsolidated data from Bankscope."* https://datacatalog.worldbank.org/bank-z-score.

DOI https://doi.org/10.3790/vjh.87.4.153

sured by the Z-score's standard deviation, has increased. In the vast majority of countries, the level of the Z-score implies that resilience is higher in 2016 than it was in 2007. However, as the negative differences in Column (3) and (6) show, in six countries the country-level Z-score has decreased. Among them, Maltese and Italian banks experienced the highest reduction of the Z-score over the crisis years.

2.6 But: Non-performing loans have also increased

By and large, both country-level indicators, the capital to assets ratio and the Z-score, signal improved resilience. Still, banking sectors in the European Union differ more widely than they did at the advent of the crisis. However, during the European financial and sovereign debt crisis, neither the capital to assets ratio nor the Z-score received much attention. In contrast, non-performing loans became a synonym for the substantial threats to banking sector stability at the level of the respective (national) market (Mesnard, Margerit, Power and Magnus 2015). Therefore, it is somewhat surprising that Euro area banking sectors' diversity levels and their relation to a country's share of non-performing loans have received little attention in the financial stability research, so far.

Thus, if resilience or vulnerability of banking sectors is gauged by the ratio of non-performing loans to all loans (*NPL ratio*),

$$NPL\ ratio = \frac{\text{Non} - \text{performing loans}}{\text{All loans}}$$

a different picture than for Z-score or capital to assets *ratio* arises. Table 7 shows the statistic of the country-level *NPL ratio* for EU member states. The country average of the *NPL ratio* is substantially higher in 2016 than in 2007. On average, over all member states, more than 8 percent of gross loans show distortions in payment, an increase of more than five percentage points between 2007 and 2016.[8] Here, given nationally differentiated macroeconomic as well as legal contexts, obviously, dispersion across EU member states is of the essence. In Cyprus, in 2016, almost half of all loans were categorized as non-performing followed by Greece with around one-third, and Italy with more than 17 percent. On the other end of the scale are the Netherlands, Germany, Luxembourg, Sweden, United Kingdom, Estonia and Finland with percentages equal or below 2.5 percent. The EU banking sectors are much more diverse in terms of NPL ratios in 2016 than in 2007. The standard deviation across countries has increased starkly, from less than two to more than ten percentage points.

A high ratio of non-performing loans may indicate that credit assessment—screening and monitoring—has been flawed, at least from an ex post vantage point. High NPL ratios, however, can also reflect a mediocre macroeconomic environment (substantial and lasting output-gaps). The consequence could be an unhealthy and stability-threatening increase in the ratio of non-performing loans. One may surmise that in banking sectors with low concentration ratios as well as (possibly) intense competition, banks face particularly high pressure on costs, and have therefore been

8 The ECB classifies a loan as non-performing when past due for 90 days, i. e. when the agreed payment schedule was not met, that is no repayment was made and no interest were paid. The definition of the World Bank is broader. Regularly operated loans where the debtholder has defaulted on other loans are classified as non-performing, as well as loans that have not been served for less than 90 days (Mesnard et al. 2015).

Table 7

NPL ratio

Country	2007	2016	Difference	Country	2007	2016	Difference
Cyprus	–	48,7	–				
Greece	4,6	36,3	31,7	Poland	5,2	4,0	–1,2
Italy	5,8	17,1	11,3	France	2,7	3,9	1,2
Ireland	0,8	13,6	12,8	Latvia	0,8	3,7	2,9
Croatia	4,8	13,6	8,8	Belgium	1,4	3,5	2,1
Bulgaria	2,1	13,2	11,1	Denmark	0,6	3,2	2,6
Portugal	2,8	11,8	9,0	Austria	2,2	2,7	0,5
Romania	–	9,6	–	Netherlands	5.4	2,5	–2.9
Hungary	2,3	7,4	5,1	Germany	2,7	2,3	–0,4
Spain	0,9	5,6	4,7	Luxembourg	0,4	1,7	1,3
Malta	5,9	5,4	–0,5	Sweden	0,1	1,0	0,9
Slovenia	2,5	5,1	2,6	United Kingdom	0,9	0,9	0,0
Lithuania	1,0	4,9	3,9	Estonia	0,5	0,9	0,4
Czech Republic	2,4	4,6	2,2	Finland	0,3	0,6	0,3
Country average	2,2	8,8					
Standard deviation	1,8	11,0					

Source: Global Financial Development Database (GFDD) of the Worldbank, own calculations. Most recent data are from 2016.

tempted to save on screening and monitoring devices. However, a closer look at concentration ratios (Table 2) or competition measures (e. g. Table 3) on the one hand and *NPL ratios* on the other hand (Table 7) hardly confirms this claim. The (too) simple equation according to which high concentration in the respective national banking sector means a low rate of defaulting loans does not work. In the EU, similar concentration levels are associated with very different levels of non-performing loans. For example, Greece has a very high *NPL ratio* with more than 35 percent in 2016, notwithstanding the fact that Greece has a highly concentrated banking sector. By contrast, the *NPL* ratio was only one percent in the similarly highly concentrated Swedish banking system. In the highly competitive German banking sector, the ratio of non-performing loans remained with two percent very low. There are, clearly, additional (confounding) variables which would have to be accounted for. This is where the national macroeconomic context comes in.

Of course, over most of the crisis years, economic growth in Germany was comparably high and, in line with this, employment rose, and unemployment decreased steadily. Thus, in contrast to many other European countries, German banks benefited from a very positive economic environment. But still, the low ratio of non-performing loans in Germany suggests that a competitive environment does not necessarily endanger banking sector stability. These observations raise two crucial questions: What role plays the real economy's structure for the performance of the banking sector? Are concentration and competition measures good proxies for institutional diversity in the banking sector?

2.7 Does it fit? Diversity in the real economy

The fit (or lack thereof) between structural features of the "real" economy and the financial sector, deemed to serve those needs, has been a controversial issue, obviously for a long time (Allen and Gale 2000, Kotz 1993). Answers found, varied across time and region. For instance, in the 1990s, a substantial part of the underperformance of the US economy was laid at the door of its underperforming financial system, geared towards short-termism (Dertouzos, Lester and Solow 1989). Different national specializations potentially come with different financial sector requirements (Chandler 1990). Firms thriving on intangible capital (IP) have different financing needs than capital-intensive industries (automotive, steel, chemical etc.). To illustrate across-country diversity in the real economy, we here focus on the capital-intensive manufacturing industry.

To account for structural differences of the real economy across EU member states, measurement is obviously key. Given the bulkiness of their capital expenditures, manufacturing firms are more likely to have large external funding needs and access to finance is crucial. Therefore, the structure of the banking sector may matter for this sector more than for other, less capital-intensive industries. For example, if a country's manufacturing sector consists only of a few large firms, the appropriate structure of the banking sector to serve those firms' financial needs may be a different one than if the firms are spread rather evenly across all size classes. Accordingly, we describe the structure of the sector using firm size classes. The most common method for aggregating size classes into a country-level index value capturing diversity is the Gini-Simpson Index (Michie and Oughton 2013),

$$GSI_M = 1 - HHI_M = 1 - \sum_{k=1}^{K} s_k^2.$$

is the share of a specific size class in the economy. This share can be based on total assets, turnover, employees, number of firms or other key indicators. To illustrate how different the manufacturing sectors are across EU member states, we focus on two indicators, the number of employees and the number of firms in a particular size classes.

Eurostat differentiates between five size classes $k = \{1,2,3,4,5\}$ with $k=1$ (from 0 to 9 persons employed), $k=2$ (from 10 to 19 persons employed), $k=3$ (from 20 to 49 persons employed), $k=4$ (from 50 to 249 persons employed) and $k=5$ (250 persons employed or more). The employment share $s_k = \frac{e_k}{E}$ of size class k equals the number of employees e in this size class divided by the total work force in the manufacturing industry. The more equal the number of employees is distributed across size classes the higher is the GSI_M, and the lower is the concentration of the workforce among firm types. If the number of employees is equal in each size class, the index has the highest possible value,

$$GSI_M = 1 - \sum_{k=1}^{5} \left(\frac{1}{5}\right)^2 = 0{,}8.$$

If all employees are concentrated only in one size class, the HHI_M is at its maximum and equals one. Accordingly, the GSI_M equals zero. Table 8 presents the distribution of the GSI_M of firm size classes across the EU. The manufacturing industry's diversity index, based on the number of employees, is the highest in Italy, Cyprus and Greece. The lowest values are observed for Slovakia, Czech Republic and Germany.

DOI https://doi.org/10.3790/vjh.87.4.153

Table 8

GSI_M based on number of employees in five classes of firm size

Country	2008	2016	Difference	Country	2008	2016	Difference
Italy	0,7877	0,7859	–0,0018	United Kingdom	0,7074	0,6949	–0,0125
Cyprus	0,7871	0,7853	–0,0017	Denmark	0,6759	0,6847	0,0088
Greece	0,7559	0,7812	0,0253	Sweden	0,6727	0,6822	0,0095
Portugal	0,7795	0,7732	–0,0063	Belgium	0,6772	0,6792	0,0021
Spain	0,7826	0,7662	–0,0164	Finland	0,6496	0,6783	0,0287
Latvia	0,7455	0,7473	0,0019	Ireland	0,7086	0,6712	–0,0375
Estonia	0,7310	0,7385	0,0075	Romania	0,6860	0,6702	–0,0158
Netherlands	0,7405	0,7358	–0,0047	Poland	0,6780	0,6678	–0,0102
Croatia	0,7148	0,7337	0,0189	Hungary	0,6908	0,6666	–0,0241
Bulgaria	0,7244	0,7280	0,0036	Austria	0,6696	0,6537	–0,0159
Lithuania	0,7223	0,7257	0,0034	Slovakia	0,6140	0,6461	0,0321
Slovenia	0,6826	0,7051	0,0225	Czechia	0,6605	0,6432	–0,0172
France*	0,7029	0,6986	–0,0043	Germany	0,6263	0,6165	–0,0098
Country average	0,7067	0,7061					
Standard deviation	0,0469	0,0473					

Source: Eurostat. Own calculations. The value for France is based on data from 2009.

Another way to proxy across-country diversity is to use the share $s_k = \frac{n_k}{N}$ where equals the number of firms n in the size classes k. With the number of firms being equal in each size class, the index would be at its maximum of 0.8. If all firms belong to only one size class the GSI_M equals zero. Table 9 shows the distribution of the GSI_M, based on the number of firms in the different size classes across the EU. The manufacturing sector in the Czech Republic, Slovakia and Greece show a particularly low Gini-Simpson Index. The highest values are observed for Luxembourg, Germany and Austria.

It should be noted, however, that diversity and concentration do not necessarily coincide. For example, if the GSI_M based on the number of firms in distinct size classes is zero because all firms in the economy belong to only the largest size class, one would obviously label the sector as highly concentrated. In contrast, if this is zero since all firms belong to the smallest size class, each of the small firms has only a small market share. In this case, the sector is highly dispersed.

Table 9

GSI based on number of firms in five classes of firm size

Country	2008	2016	Difference	Country	2008	2016	Difference
Luxembourg	0.564	0.593	0.029	Latvia	0.504	0.300	–0.205
Germany	0.571	0.568	–0.003	Hungary	0.271	0.282	0.010
Austria	0.457	0.453	–0.004	Lithuania	0.377	0.268	–0.109
Romania	0.458	0.451	–0.007	Ireland	0.327	0.266	–0.061
Bulgaria	0.486	0.409	–0.077	France*	0.285	0.247	–0.038
Denmark	0.457	0.403	–0.054	Netherlands	0.378	0.230	–0.148
Estonia	0.539	0.396	–0.142	Poland	0.228	0.218	–0.010
United Kingdom	0.421	0.374	–0.046	Sweden	0.235	0.214	–0.021
Finland	0.323	0.335	0.012	Slovenia	0.251	0.213	–0.038
Portugal	0.313	0.322	0.008	Cyprus	0.230	0.198	–0.032
Croatia	0.286	0.312	0.026	Czechia	0.176	0.134	–0.041
Italy	0.323	0.310	–0.013	Greece	0.085	0.132	0.047
Spain	0.355	0.309	–0.046	Slovakia	0.702	0.113	–0.589
Belgium	0.327	0.300	–0.027				
Country average	0.3678	0.3093					
Standard deviation	0.0185	0.0138					

Source: Eurostat. Own calculations. *France pre-crisis value is calculated using the 2009 value as the 2008 data are not available. Malta is removed from the sample because of too many missing values.

3 How to measure banking sector diversity?

In the 1980s and 90s financial development was considered as major determinant of economic growth and productivity (see Schrooten in this issue). However, the 2007/8 international financial crisis clearly revealed the shortcomings of neglecting the institutional structure of the financial sector. All of the above documents that gauging the institutional diversity of a banking sector raises a number of pertinent questions. They, first of all, refer to the characteristics or properties over which banks might differ. The most pertinent indicators of difference have to do with a bank's size and scope (of activities, its business model (activities emphasized), its funding structure (interacting with the structure of assets) as well as ownership structures and objectives (maximizing profits, or performance objectives: for example, serving membership needs, as cooperatives strive for, Kotz et al. 2007).

As seen before, in terms of size of institutions, indicators of concentration and competition may serve as proxies. Therefore, market shares can be a good starting point for building a diversity indicator. However, given that banks are multi-product firms, one would also have to account for various business lines or activities, such as taking deposits, lending, structure of assets and liabilities or employment. Given this variety, the research question at hand should determine what market share is the relevant one to be used in the diversity indicator. For example, assume that one wants to assess the impact of diversity on bank stability. Large banks are more globally connected than small or local banks. Therefore, size-related risk plays an important role in financial stability

regulation. The Basel Committee on Banking Supervision (BCBS) accounts for size-related risks by defining "buckets requiring corresponding to higher capital buffers that they are required to hold by national authorities".[9] Size is an important criterion for being assigned to a particular bucket. The higher a bank's bucket the larger is the capital surcharge.[10] Size is also an important criterium within the European Single Supervisory Mechanism (ESM). The ECB is charged with directly supervising a bank if the size of its balance sheet is larger than 30 million euros.[11] Accordingly, for assessing the impact of diversity on bank stability, the distribution of total assets across a banking industry can serve as a suitable indicator.

There are as many ways to group banks as defining characteristics—attributes—are assessed as pertinent. These properties can serve to break out—cluster—banks into fairly homogenous groups (using specific metrics—e. g. Euclidian distance—to capture similarity). A common grouping criteria in banking is according to business models or missions, either as commercial banks (profit-seeking), saving banks (serving a public purpose) or credit unions (serving their members). In most countries, more than 80 percent of banks fall under these three headings. Accordingly, different missions are at the center of the discussion revolving around banking sector diversity.

Thus, dividing criteria are selected to create groups with rather homogenous banks. The degree of homogeneity within commercial banks, saving banks and credit unions may be considered as a case in point. Ayadi et al (2009, 2010) employ a different taxonomy. They define five distinct business model and group banks along those business models. In line with Ayadi et al (2009, 2010), Bley (in this issue) and Gischer and Ilmann (in this issue) also use the distinctness of business models to distinguish bank types (see also Gärtner and Flögel in this issue for an alternative concept to identify distinct banking groups).

Another way of grouping banks would be to start from pre-defined size classes. Grouping into size classes requires defining the number of classes, which is obviously arbitrary. Alternatively, each bank could be treated as distinct type. Then, grouping is unnecessary. Each bank's market share would be used in the diversity indicator without aggregation over groups.

Finally, for each country's banking sector the market share of the selected group in the selected dimension needs to be aggregated into one single indicator of diversity for the country. As already mentioned, the most common method of aggregation is the Gini-Simpson Index,

$$GSI = 1 - \sum_{n=1}^{N} s_n^2 .$$

The index increases with the number of banks or banking groups and decreases with the degree of inequality in the market shares of each bank or banking group. For example, in case of *3* banking groups, say commercial banks, savings banks and cooperative banks, the *GSI* would be the highest if each banking group possesses an equal market share of one-third of total assets (or deposits or gross loans, etc.) in the domestic banking sector. The country-specific indicator would

9 www.fsb.org/wp-content/uploads/P161118-1.pdf

10 www.bis.org/publ/bcbs255.pdf

11 www.bankingsupervision.europa.eu/banking/list/criteria/html/index.en.html

DOI https://doi.org/10.3790/vjh.87.4.153

be minimal if only one group exists, *GSI=1–1=0*. Note that *GSI* increases in the degree of equality in market shares but also in the number of distinct banking groups.

Another standard measure for aggregation is the Shannon index:

$$SI = -\sum_{n=1}^{N} s_n \ln s_n ,$$

SI is also known as entropy measure of industrial diversification (see e. g. Brown and Greenbaum 2017, Attaran and Zwick 1987). The entropy is the average *ln* probability of belonging to a specific group where N is the number of groups (size classes, specialization groups etc.). With equal shares 1/N in total assets/deposits/gross loans the Shannon index is at its maximal value of *ln N*.

4 Banking sector diversity and stability

Previous research proposes that banking sector diversity basically affects financial stability through two channels. One channel is diversification. In the literature two concepts of diversification are used, diversification across bank types and bank-internal diversification. Although both rely on diversification, the expected relation to bank stability is quite different.

Bank-internal diversification refers to diversification at the level of an individual bank: meaning for example expanding into new business fields, establishing new branches, or catering to new geographies (e. g. Baele, Jonghe and Vennet, 2007). This within-diversification is often about economies of scale and scope, hence advantages pursued arise from conglomeration and size. As a corollary, the more comprehensive the lines of business pursued and the wider the reach of markets, the larger bank balance sheets will be. This could raise efficiency, depending on activity lines (Berger and Humphrey 1997), though only up to a point: Given the higher number of diverse, weakly-linked business activities, bank-internal diversification poses substantial challenges to bank management, potentially reducing monitoring efficiency (e. g. Acharya, Hasan and Saunders 2006, Stiroh and Rumble 2006). Regularly, the strive for scale at the level of individual banks (often through mergers), increases concentration ratios in national banking markets. Moreover, strategies pursued by bank managements are often quite similar. Under the scrutiny of markets (and peers), it is too costly to deviate. In the aggregate, this creates homogeneity. And it builds systemic vulnerability when a shock hits (see again Boot 2014), which can of course also arise internally, within the banking (or financial) system. Accordingly, from a societal perspective, risks (potential societal costs) arising from bank-internal diversification, beyond a certain level, could over-compensate the alleged benefits of size and scope.

At a sectoral level, diversity captures differences in bank types, i. e. between individual intermediaries, differentiated along a number of defining characteristics (mentioned above). Of course, this is a longstanding debate, always rehearsed in the immediate wake of financial sector troubles. In the early 2000s, when the EU launched its Financial Services Action Plan, the consensus view was that capital markets should be emphasized. This had already been the policy pursued in France in the mid-1980s (Melitz 1999). Concurrently, a somehow opposite view was taken in the US. There, in order to rein in short-termism, a re-orientation towards universal banking (and less of stock-market reliance) was strongly recommend (see again Dertouzos et al. 1989). This led

to the demise of Glass-Steagall (separation of commercial and investment banking) and McFadden (prohibition of interstate banking). In this line of reasoning, quite unsurprisingly, the most recent Great Financial Crisis has spawned a new interest in financial architecture with a renewed emphasis on less innovative and more boring banking (Schackmann-Fallis and Weiss, in this issue). Given the almost prohibitive costs of the GFC (going far beyond its financial fallout), this is too easy to understand. In a few pioneering studies it is argued that a diverse banking sector (i. e. diverse in terms of individual institutions) will enhance financial stability when the system is shocked (among them Ayadi et al 2009, Ayadi et al 2010, Haldane and May 2011). Banking crises regularly come with access to funds problems, especially for credit-dependent clients. These are, for reasons of their information-impactedness, mainly SMEs. With the access to capital markets practically infeasible (for reasons of information asymmetries, agency problems and ensuing prohibitive transaction costs, see Stiglitz and Weiss 1981)), they are mostly affected when credit crunches hit. Hence, the argument goes, banks (or intermediaries) less exposed to problematic assets (non-performing loans or exposures) could substitute in their funding function for the 'real' economy institutions which are in trouble. The search for the one (and only) optimal financial system is probably vain (Allen and Gale 2000). Financial systems come with strong national traits, also in the EU. They are embedded (and influenced) by other societal systems (e. g., insolvency mechanisms, retirement funding etc.). Still, getting a better understanding of how diversification impacts on efficiency as well as stability is crucial.

5 Banking sector diversity and competition

The second channel through which diversity could affect financial stability is competition, the contestability of markets. Again, this is obviously an old, pertinent policy issue. And, over time, different solutions have been found. The US, for example, for a long time upheld (and practically implemented) the idea banking at its core should be driven by community banks. There is an underlying political economics to that (Roe 2003). In any case, politics is important to understand activity (Glass-Steagall Act) as well as regional restrictions (McFadden Act), in place until the late 1990s. In Europe, up until the 2000s, it was not so much size but differences in business models which defined diversity. The German banking industry, with its three-pillar structure, is a particular pertinent case. However, it seems to be less an issue of missions or governance, than the structure of balance sheets (and what is going on off balance) that has been the defining characteristic of diversity. Balance politics speaks louder than mission words (Kotz and Schmidt 2017). Still, the relationship is under-researched: For example, what aspect of diversity is important with regard to competition? Does diversity necessarily spell a higher level of competition? One could, for instance, argue that a diverse landscape of banks, in terms of size and business models, could increase the choice set of clients and hence sharpen competition. (It would show in lower returns on equity—and seems to be borne out by the German case.) If this were true, diversity and competition were complementary, almost two sides of the same coin. Hence, possible trade-offs between competition/diversity and stability would be the same.

Starting from here, one strand of the competition literature proposes that a more competitive and less concentrated banking system is more fragile and less stable (Beck, Demirguc-Kunt and Levine 2005, Berger, Klapper and Turk-Ariss 2008, Beck, Jonghe and Schepens 2013, Smaghi in this issue). Banks are less profitable, can build lower capital buffers and therefore are more vulnerable. As concerns developments post-GFC, Canada, Australia or Sweden and France are often rendered

as cases in point. At the same time, though not speaking to the financial stability issue, based on micro data of banks in different regions of Kazakhstan from 2004, Schäfer, Siliverstovs and Terberger (2010) show that more competition can affect SME-lending positively in an emerging economy. Schaeck, Wolfe and Cihàk (2009), confirming standard priors, report that competition could stimulate firms' innovativeness and encourage banks' efficiency by keeping loan rates low. Both results would imply beneficial effects for financial stability. On the other hand, markets with high concentration ratios and inevitably "too big to fail"-banks, hence with implicit government guarantees, are prone to take excessive risk, thus potentially endangering stability. That is why those institutions call for more rigorous regulations (capital and liquidity ratios).

Schaeck and Cihák (2010) use a panel dataset for European banks from Austria, Belgium, Denmark, France, Italy, Germany, Luxembourg, the Netherlands, Switzerland, and the United Kingdom, covering the period 1995–2005 and a cross-sectional sample of banks operating in rural counties in the U.S. in 2005. They reveal that competition increases banks' efficiency. Akins, Li, Ng and Rusticus (2016) uses data of banks from all US States during the period 2000–2010. They find that higher competition has a disciplining effect in the sense that it is associated with lower risk-taking by banks and higher mortgage rejection rates. Such behavior should make banks less likely to suffer from non-performing loans. Most recently, Götz (2017) found that an increase in market contestability in the US significantly increases bank stability, lowers the share of non-performing exposures and improves bank profitability.

6 Banking sector diversity and structure of financial system

The most recent debate on the optimal structure of the financial system leaves the issue of banking sector diversity largely aside. Instead, it focusses on the question of whether banks are too dominant vis-a-vis other financial intermediaries. Langfield and Pagano (2015) document that an increase in the size of the banking system relative to equity and private bond markets is associated with more systemic risk and lower economic growth, particularly during housing market crises. Gambacorta, Yang and Tsatsaronis (2014) report that if an economic downturn coincides with a financial crisis, the effect of the crisis on GDP-growth is three times more severe for bank-oriented economies then it is for market-oriented ones. Hoffmann and Sorensen (2015) argue, "*that domestic bank dependence made countries, regions, and sectors* [of the European Union] *with many SMEs more vulnerable to global banking sector shocks and, at the same time, provided little risk sharing.*" While this might hold on average, Germany and Austria are quite significant outliers.

Based on the diagnosis that European firms and households are too bank-dependent, the European Commission launched the Capital Markets Union (CMU) proposal, which promotes a stronger emphasis on non-bank funding channels in order to improve SME financing (European Commission 2015, Fouche, Neugebauer and Uthemann 2016). The policy strategy thus does not suggest dis-intermediation but dis-banking. The CMU-proposal builds heavily on the market- versus bank-based paradigm but, astonishingly enough, the European Commission left the issue of banking sector diversity aside (Kotz and Schäfer 2017 (editors), Kotz and Schäfer 2017).

However, while the dichotomy between market-oriented versus bank-oriented economies does serve a pedagogical purpose, it has long been inappropriate to understand the closely knit in-

DOI https://doi.org/10.3790/vjh.87.4.153

teraction between markets and intermediaries: Much of what seemingly is at the discretion of bank management is obviously largely driven by market prices. The binary view hence cannot account for a much more complex reality. For example, Gambacorta et al.'s (2014) findings, i. e. that market-based systems are (on average) better able to absorb shocks than bank-based systems, may suffer from an omitted variable problem as they do not control for the heterogeneity of diversity in banking sectors. They also disregard differences in macroeconomic environment, in particular the interaction between fiscal and monetary policy. Thus, the explanation for their findings may well be found beyond the dichotomy of market-oriented versus bank-oriented economies.

7 What role does institutional diversity play in financing SMEs?

Stein (2002) finds that large banks focus primarily on transaction-based lending and lending to large businesses. Hardie and Howarth (2013) suggest that the dominance of large banks goes hand in hand with the rise of transaction-based financing and the decline of relationship lending. Previous research proposes that relationship lending is especially important for small and medium sized firms (SMEs, see e. g. Boot 2000). These firms are often opaque and information asymmetries are particularly pertinent (Petersen and Rajan 1994 and Berger and Udell 1995). Consequently, they are more likely to be subject to financial constraints and severe funding gaps than large firms. Moreover, if SMEs are innovative the difficulties of receiving funds may even be more pronounced (see e. g. Schäfer, Stephan and Solórzano Mosquera 2016). Using US data, Berger, Miller, Petersen, Rajan and Stein (2005) reveal that smaller banks have a comparative advantage in relationship lending. Small banks are supposed to face less severe contracting problems and organizational dis-economies than larger institutions with multiple layers. They are closer to their clients, foster long-term relationships (see also the excellent survey by Hellwig 1991). De Haas, Ferreira and Taci (2010) find that small banks in transition countries lend a higher share of their loan volume to SMEs than do large banks. Behr, Norden and Noth (2013) report that local publically-owned banks in Germany reduce firms' financial constraints and have a less cyclical lending behavior. Hakenes, Hasan and Molyneux (2015) construct a theoretical model proposing that in regions with substantial hurdles in terms of access to finance, small, local banks can spur local economic growth better than larger banks, acting on an inter-regional scale. They produce confirming evidence by using German data.

Economies of specialization in relationship lending would imply that the disappearance of smaller banks is non-neutral in terms of innovation and growth. Financial access for small, opaque businesses may become more difficult (e. g. Lehmann and Neuberger 2001). Consequently, SMEs' innovation potential and growth as well as their survival chances could be hampered (Schäfer und Talavera 2009). Relationship lenders are also more likely to invest in restructuring know-how (Schäfer 2002, Brunner and Krahnen 2008) and also to stay with their clients during difficult times (D'Aurizio, Oliviero and Romano 2015).

Gambacorta and Marques-Ibanez (2011) find that during crisis periods banks with greater dependence on funding through markets and more volatile non-interest income activities restrict loan supply more than other banks do (see also Dwenger, Fossen and Simmler 2015). Bartoli, Ferri, Murro and Rotondi (2012) support the notion of complementarity between both lending technologies—transaction-based and relationship-based lending—but reject substitutability. In addition, Bolton, Freixas and Gambacorta (2016) propose that only comparatively safe firms prefer

transaction-based funding while normal (risky) firms opt for a combination of transaction and relationship borrowing.

Given that the coexistence of different bank types increases the likelihood of some banks staying solvent when others are existentially hit by a crisis, the above mentioned literature implies that SMEs' resilience and growth would benefit from institutional diversity in the banking sector. Considered from these perspectives, the coexistence of large (international) and small, locally oriented, banks in a country's banking sector should be conducive for SMEs, lowering barriers to financial access and enhancing resilience.

Despite the immense importance of SME financing for innovation and growth, previous research focusing on the Eurozone member states has not yet provided conclusive evidence about the role of banking sector diversity for availability and stability of SME funding. Country-specific case studies (see Flögel in this issue), more comprehensive individual firm data in combination with country-level measures of institutional diversity in the banking sector and key indicators representing the structure of the "real" (i. e. non-financial) economy may help to make considerable progress in this respect.

8 Conclusions

Policies—as well as changes in the basic conditions of banking (e. g. technological innovations)—do have structural impacts. This, clearly holds true for the major reform initiatives the EU Commission has launched over the recent decades, including the FSAP of the early 2000s, as well as the banking regulations (leading to the CRRD IV or MiFiDII and MIFIR) and recent initiatives around the Capital Markets Union. They have a bearing on industry structure (size and number of competitors) as well as the diversity of institutions along a number of dimensions. Essentially, they often reduce diversity, increase homogeneity. Diversity, of course, comes with costs and benefits. It creates segmentation and produces gaps between markets. But it also seems to allow for improving problem solving capacities and resilience (e. g. Page 2014).

In the recent financial crisis, all else equal, those banking systems which had institutions with distinct differences in activity profiles seemed to have fared better (e. g. see Bertuch-Samuels and Schackmann-Fallis and Weiß in this issue). Interestingly, most of these banks, given their ownership structures, were less demanding in terms of their profitability objectives. Also, they were not exclusively concerned about shareholder value. Instead, they often pursued finding a balance between a more comprehensive set of objectives, including debtholders as well as employees. This showed, in particular, in differences in asset structures as well as leverage. A more diverse banking industry also seems to improve problems of access to funds, obviously for the most bank-dependent firms, i. e. SMEs. Through this channel, diversity could support innovative SMEs and thus nurture growth, coming with overall societal benefits.

Clearly, more research would be practically useful here. Financial intermediaries and markets are continuously responding to contextual changes. Thinking about a healthy—sustainable—architecture for finance is thus a lasting challenge. In light of its inevitable reverberations—there's a substantial complementarity between finance and other societal sub-systems, not touched upon

here (see especially Hall and Soskice 2001 and Amable 2005)—far beyond finance, this is also a debate with high pertinence for a general public.

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