

The analytical framework for identifying and benchmarking systemically important financial institutions in Europe

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Renata Karkowska*

The aim of this article is to identify systemically important banks on a European scale, according to the criteria proposed by supervisory authorities. In this study, we discuss the analytical framework for identifying and benchmarking systemically important financial institutions. We selected a group of 36 largest banks in Europe and analyzed their risk indicators, i.e.: leverage, liquidity, capital ratio, asset quality and profitability, as a source of systemic risk. The aim of the study is to find out whether the size of an institution generates higher systemic risk. We find that risk indicators of excessive debt, liquidity, capital adequacy and effectiveness for the largest commercial banks in Europe do not differ from the average across Europe.

Keywords: banking, Systemically Important Financial Institutions, SIFI, systemic risk, liquidity, leverage, profitability.

JEL: F36, F65, G21, G32, G33

Identyfikacja i analiza porównawcza instytucji systemowo ważnych w Europie

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Mając na uwadze kryteria klasyfikacji banków systemowo ważnych (tzw. SIFI), celem artykułu jest identyfikacja największych banków w skali europejskiej oraz wskazanie na charakter podejmowanego przez nie ryzyka o charakterze systemowym. Badanie zostało przeprowadzone na podstawie sprawozdań finansowych 36 największych banków komercyjnych w Europie. Analizie zostały poddane wskaźniki ryzyka o charakterze systemowym, tj. dźwignia finansowa, płynność, wskaźnik kapitałowy, jakości aktywów, oraz rentowność banków. Uzyskane wyniki pokazały, że na tle wartości średnich dla całej Europy wskaźniki ryzyka największych banków (tzw. SIFI) pozostają na zbliżonym poziomie.

Słowa kluczowe: sektor bankowy, Systemically Important Financial Institutions, SIFI, ryzyko systemowe, płynność, dźwignia finansowa, rentowność.

* **Renata Karkowska** – PhD, University of Warsaw, Faculty of Management.

1. Introduction

The crisis of 2007–2008 revealed a serious lack of information on the size and condition of financial markets and institutions at the sector level. It turned out that supervisory authorities do not have sufficient sources to identify global markets and mega financial institutions of systemic importance – Systemically Important Financial Institutions (SIFIs). The identification of systemically important institutions has become a priority for regulatory authorities but the problem turned out to be more difficult than previously thought. Statements by practitioners and academics present the position that the amount of assets is not the only prerequisite for the systemically important institutions category. Cooperation between the Financial Stability Board, the Committee on the Global Financial System, the Basel Committee on Banking Supervision, the Committee of Payment and Settlement Systems aimed to identify global systemically important institutions, and thereby reduce systemic risk.

Under the Basel III Accord, banks identified as systemically important are subject to higher capital, asset quality, liquidity and leverage ratio requirements (EMEA, 2014). Systemically important banks that issue more secured debt will have less flexibility as regards selling off assets during a crisis period. The increases in leverage meant that banks could expand faster and to a greater extent than would have been possible had they maintained the same capital ratios. The internal models and risk weighting (of Basel II) allowed banks to increase leverage, which led to lower resilience. This lack of external monitoring gives rise to the agency problem, which allows bank managers to record relatively high rates of return on equity. The literature has shown that this leads to managers pursuing growth and taking excessive risk (Liikanen, 2012). According to the research by Demirgüç-Kunt and Huizinga, liquidity gaps may appear in funding some specific business lines. For example, the parent bank may provide funding using the group's internal capital market. But these intra-group transactions tend to be subject to strict limits (Demirgüç-Kunt and Huizinga, 2011). Cornett et al. (2010) ask the question whether risk management information is adequate to monitor the aggregation of risks to give early warning indicators.

The BIS report (2013) presents a set of principles to strengthen banks' risk data aggregation capabilities. Effective implementation of the rules is expected to enhance risk management and decision-making processes at banks. In October 2014, the European Commission adopted a delegated act to calculate the banks' contributions to the national resolution funds, according to a bank's size and risk profile (EC, 2012), (FSB, 2012).

On the other hand, the regulatory expert group has considered whether there is a need for structural reforms of the EU banking sector. The main demands of the group are: assign trading activity to a separate legal entity; strengthen boards and management in banks; improve risk disclosure, promote the risk management function and strengthen sanctions (Liikanen, 2012).

Given the above doubts, the study is to compare the risks taken in the largest banks (in terms of total assets) with those taken by other banks in Europe. In the study, a hypothesis was put forward that the risk taken by the largest banks in Europe is not higher than in other banks. Therefore, we should pay special attention to smaller banks which, operating as a group, may contribute much more to the instability of the banking sector. A more important aspect will be the risk of SIFIs substitutability of their services and international relations, in the light of the potential danger of bankruptcy of one of the largest banks.

The rest of the paper is organized as follows. In section 2, we present a SIFI definition and terminology. In section 3, we show research methodology. In section 4, we calculate the risk ratio for the largest banks in Europe and discuss the results. Finally, section 5 contains conclusions.

2. The concept and role of systemically important institutions

In recent years, the doctrine of a bank “too big to fail” has been based on the belief that some banks should receive funds in the event of risk of bankruptcy because of their size and importance of the financial sector. This is due to the belief that the collapse of one bank could cause serious disturbances in the functioning of the financial system. The existence of an institution whose activities have a significant share in the domestic or international market means that any disruption of the functioning of the entity prevents proper functioning of other entities. This, in turn, causes accumulation of systemic risks and problems with public finances of countries.

The reason for the introduction of the above-mentioned categories of mega-institutions are:

- the phenomenon of financialization of the economy, i.e. separation of cash transactions from material goods and services markets within the meaning of real economic transactions,
- risks generated by Too Big to Fail (TBTF) institutions.

Until September 2008, the general principle of Too Big To Fail was valid in relation to global capital groups – too big to fail or being able to finance their liquidation. The costs of bankruptcy of systemically important institutions are so high that they cannot be covered by public finance of the home or host country.

The concept of systemically important institutions emerged following the deliberations aimed at identifying the situations and financial institutions which may lead to the materialization of systemic risk. Mega-institutions have such a large network of connections that their bankruptcy would cause a significant disturbance of the whole financial system.

A proposal for the concept of systemically important institutions is presented in Table 1 Weistroffer (2011).

Dimension	Contributing to systemic risk	Participation in disturbances transmission
Systemic significance	marginal part in disturbances, controlled bankruptcy	expected participation of institutions in the materialization of systemic risk; losses for the bank's customers
Risk measures	<ul style="list-style-type: none"> – the share of interbank liabilities – liquidity and maturity of assets – the effect of transmission of contagion risk, volatility of asset prices in different markets 	<ul style="list-style-type: none"> – correlation with assets value – leverage – risk absorption capacity
Macroprudential Policy	<ul style="list-style-type: none"> – taking into account the costs of bankruptcy – avoiding moral hazard behavior 	ability to survive systemic events

Table 1. Conceptual dimensions of systemically important financial institutions. Source: own study based on Weistroffer (2011).

Systemically important institutions are those whose impact can have negative effects on the functioning of the financial system on an international scale.

2.1. Criteria for the classification and categories of systemically important institutions

Given the lack of a clear definition of systemically important institutions, a market benchmark has been considered as a quantification of the size that might indicate the existence of systemic risk. It seems that this indicator should be fairly stable in the face of daily market volatility and be used to define a long term strategy. At the same time, it should encourage the boards to use prudential norms and not to take steps leading to manipulation.

According to the literature and guidelines issued by the Financial Stability Board (FSB) and the Basel Committee on Banking Supervision (BCBS), basic indicators of danger of systemic risk can be identified based on the following criteria:

- size (the total value of the position calculated for the purposes of the leverage ratio under Basel III in relation to the total of positions),
- international links (the sum of receivables/liabilities from financial institutions relative to total receivables from all banks),
- degree of substitutability of services and infrastructure (the value of assets that the bank holds in custody as a depository with respect to their value for all banks included in the study),
- complexity (nominal value of OTC derivative transactions, the value of assets in the trading book),
- transjurisdictional activity – foreign receivables/liabilities to the claims of all banks included in the survey (BIS, 2011, pp. 4–10).

The methodology involves the use of 20% weight for each of the indicators.

The size of Systematically Important Financial Institutions

Frequently, the size of assets, equity, and market turnover are adopted as measures to determine the meaning of a mega-institution. According to the typology adopted by the ECB, large banks are regarded as those with an asset size greater than 0.5% of the consolidated total assets of the banks of the European Union. Table 2 provides a summary of the banks in Europe (from the group of the 100 largest banks in the world according to BIS) with the greatest relationship of the share of assets to gross domestic product. This means that in other countries there are no banking institutions of such big sizes. It should be noted that in all these countries the share of large banks is more than half of the assets of the banking system, which can be an important source of risk in the context of systemic risk. This statement also reflects the strong processes of consolidation of the banking system in developed countries of Europe and the dominance of large institutions. Nearly 30% of the total number of banks in each of the analyzed developed countries are capital banking groups (see Table 2). Descriptive statistics for the selected group of the largest banks in Europe are presented in Appendix 1.

No	Bank	Country	Assets (USD bn)	Assets (% of the country's banking system)	Assets (% of the country's GDP)
1	Deutsche Bank	Germany	2822	76.9	81.1
2	HSBC	UK	2652	27.8	108.1
3	Barclays	UK	2545	26.7	103.8
4	BNP Paribas	France	248	39.3	91.5
5	Crédit Agricole S.A.	France	2269	35.9	83.7
6	Royal Bank of Scotland Group	UK	2208	23.2	90.0
7	Banco Santander S.A.	Spain	1627	50.7	116.4
8	Société Générale	France	157	24.8	57.9
9	ING	Netherlands	1558	90.2	194.2
10	Lloyds Banking Group	UK	15	15.7	61.2
11	UBS	Switzerland	1478	57.5	238.0
12	UniCredit	Italy	1202	45.0	58.2
13	Credit Suisse Group	Switzerland	1092	42.5	175.9
14	Nordea Bank	Sweden	892	47.9	162.4

15	Commerzbank	Germany	847	23.1	24.3
16	Intesa Sanpaolo	Italy	839	31.4	40.6
17	Banco Bilbao Vizcaya Argentaria S.A.	Spain	784	24.4	56.1
18	Standard Chartered	UK	624	6.6	25.5
19	Danske Bank	Denmark	590	100.0	183.6
20	Dexia	Belgium	518	59.0	104.2
21	DnB ASA	Norway	397	100.0	79.1
22	Bankia S.A.	Spain	392	12.2	28.0
23	Svenska Handelsbanken	Sweden	365	19.6	66.5
24	KBC	Belgium	360	41.0	72.4
25	Skandinaviska Enskilda Banken	Sweden	341	18.3	62.0
26	Banca Monte dei Paschi di Siena	Italy	292	10.9	14.1
27	Erste Group Bank	Austria	271	58.5	66.1
28	Swedbank	Sweden	263	14.1	47.9
29	Banco de Sabadell S.A.	Spain	210	6.5	15.0
30	Banco Popular Espanol S.A.	Spain	199	6.2	14.3
31	Bank of Ireland	Ireland	199	54.9	94.8
32	Raiffeisen Bank International	Austria	192	41.5	46.9
33	SNS Reaal	Netherlands	169	9.8	21.1
34	Banco Popolare	Italy	168	6.3	8.1
35	UBI Banca	Italy	168	6.3	8.1
36	Allied Irish Banks Plc	Ireland	163	45.1	78.0

Table 2. The list of the largest banks in Europe (from the group of the 100 largest banks in the world): the value of assets in the domestic banking system and GDP. Geographical breakdown, as of the second quarter of 2012. Source: own study based on BIS database.

This is the approach of the Financial Stability Board and the Bank for International Settlements annually updating the statistics for 100 largest banks in the world. For comparison purposes, these values are presented as an indicator relative to GDP or market capitalization. Undoubtedly, the size of an institution is an important factor generating systemic risk but not the most important one. Bankruptcy of larger institutions causes higher losses in big economies than in small ones. In other words, the larger the institution in terms of assets, capitalization, etc., *ceteris paribus*, the stronger the impact of systemic risk. On the other hand, it should be considered whether limiting the size of financial entities will promote security of the financial system. Empirical research on whether the costs of maintaining a large financial institution outweigh the benefits of economies of scale is varied. And the issue of the impact of the size of an entity on its share of systemic risk in the world seems to be still unresolved and require further research.

International links

Interconnectedness of financial institutions is generally measured by the share of assets and liabilities in a system or intra-system, for example the value of credit exposure of an institution contributed to the rest of the system and its contribution to systemic risk, which is the contribution of credit risk to the rest of the system, and thus the potential involvement of the institution in the systemic event. The Basel Committee also proposes to use the interbank funding rate, i.e. the share of the funding coming from sources other than retail deposits in total liabilities. They also reflect claims and liabilities in the interbank financial markets and the allocation of credit risk between financial institutions. Due to the risk allocation/diversification and liquidity, interconnectedness can bring benefits to the diverse structure of the financial system.

The substitutability of services and infrastructure

Substitutability of a financial institution is particularly difficult to measure. It should not be wrongly identified with market dominance. Although the Basel Committee proposes to use the indicator “total assets under custody” or “payments settled through payment systems”, it would be more appropriate to analyze scenarios and the likelihood that an institution exits in the market and no longer offers its services. Such measurement of substitutability of services requires (a) a consistent definition of what constitutes a market system, and (b) a definition of the market share of systemic importance.

The assessment of substitutability should not be limited to financial intermediaries but also include markets or payment systems which can play an important systemic role in the financial system and the whole economy at the national level or international level (FSB et al, 2009, p. 2). The author’s research suggests that a cause of systemic disruptions may be, for example, the repo market, which has been developing intensively since the security deposits requirement was introduced in derivative transactions. Supervisors have a strong basis in supporting the smooth functioning and flexibility of the market. During the crisis, it turned out that the infrastructure of transaction settlement had basic flaws that could lead to serious instability in times of market stress (Karkowska, 2013). An example of the above is the bankruptcy of Bear Stearns, which was the main repo market clearing entity. Its bankruptcy meant that money market funds would receive Bear Stearns collateral instead of money, which, in the absence of the possibility of the collateral liquidation, would lead to a run on the financial market (Acharya, Richardson, 2009, p. 297).

Complexity of components of the financial system

Complexity relates generally to the organizational structure of an institution but its sources also refer to a complex structure of assets. The Basel

Committee expresses the latter view and measures the complexity of the notional value of OTC derivatives, especially those whose valuation is not directly observable in the market. Such an approach to measures of complexity is based on the assumption that more complex assets are harder to sell and more complex corporate structures are more difficult to resolve. In both cases, finding appropriate indicators is rather difficult.

Transjurisdictional activity (global activity of a company)

The activity of a global financial institution is generally measured by the level of cross-border claims and liabilities. The Basel Committee also proposes it as an auxiliary measurement of non-domestic revenues. Generally, it is assumed that banks conducting their activities globally are a particular threat to the stability of the global financial system compared to those that are active only in domestic markets. Globally active banks are often bigger than domestic ones and, due to foreign financing, their exposure may result in a wider transnational channel of systemic risk contagion.

On the other hand, the measurement of global activity of banks is a typical example proving that the regulations concerning the relevance of systemic institutions should not be used for comparative purposes for regulatory authorities. This is because the imposition of regulatory burdens for cross-border claims and liabilities implies the risk of causing unintended side effects. If, through the regulation of SIFIs, banks operating globally generate higher marginal costs in their cross-border activities than their local competitors, they will automatically become less competitive. Čihák (2011) and Mayer (2011) argue that systemic immunity increases with increasing cross-border linkages, at least to a point. After crossing the optimum point, the resistance decreases again until a financial institution restores a kind of “elasticity”. In connection with the sovereign debt crisis in some EU Member States, large cross-border institutions could help create a more flexible banking system in the euro area and provide a stable basis for financing. Opinions on the risks arising from the activities of global banks are divided.

These criteria cannot be considered as the only determinants of SIFIs. What also should be considered are gross or net income, market capitalization criteria in the case of size, volatility contagion effect (contagion) or assets correlation.

Systemically important intermediaries can also be distinguished based on offering payment services, risk management, and investment programs. Frequently, as single entities, they may mean little but their inherent lack of substitutability may lead to the system crisis. Brunnermeier (2009) introduces the categories of financial institutions in the context of the channels of spreading disturbances:

- systemically important financial institutions, which – because of their size and concentration of activity – are considered to be dominant in the relevant market according the classical doctrine of “too big to fail”;

- large and complex financial institutions, i.e. insurance companies or pension funds, usually regarded as systemically irrelevant in the international context. However, they may have a significant economic impact on the economy in the event of disruption of business;
- small-sized in terms of assets and irrelevant for a single entity, and analyzed in terms of groups which may have significant systemic importance due to a high level of assets correlation and risk taking. An example of this type of SIFI category are investment funds, i.e. cash and hedge funds;
- small entities, but with significant activity in term of conducted financial transactions. An example of those can be brokers nationwide.

On the one hand, the new prudential standards support the safety of banks and the entire financial system stability. On the other hand, by imposing stricter prudential standards on banks, the new regulations hinder their functioning and inhibit the growth of banking. They should therefore be prepared reasonably.

3. Research methodology

In view of the selection criteria used to qualify banks as systemically important institutions, the study was based on an analysis of indicators for risk and efficiency of the activities of the largest (in terms of total assets to GDP) commercial banks in Europe. For this purpose, a research group was selected – 36 commercial banks of the 100 largest banks in the world, according to the classification made by the Bank for International Settlements. In turn, for the newly selected group of European banks, the following risk indicators ($RI_{i,t}$) were estimated:

$$RI_{i,t} = \frac{BF_{i,t}}{W_{i,t}} \quad (1)$$

where *Bank factor* ($BF_{i,t}$) in Bank i and in time t is used:

Leverage ratio = *Banks Equity/Total Assets* (as a solvency risk factor),

Profitability = *Profit before tax/Total Assets* (as an indicator of excessive bank margins and risk-taking),

Liquidity = *Liquid Assets/Customer Deposits* (as a liquidity risk indicator),

Capital Ratio (as bankruptcy risk),

Credit Asset Quality = *Loan Loss Provisions/Total Assets* (as credit risk signals),

Loans/Total Assets of a bank (also a credit risk indicator), as a source of potential systemic risk signals.

$W_{i,t}$ – bank factor is weighted by *Bank i Total Assets* in time t .

i – set of the largest European banks indicated in Appendix 1.

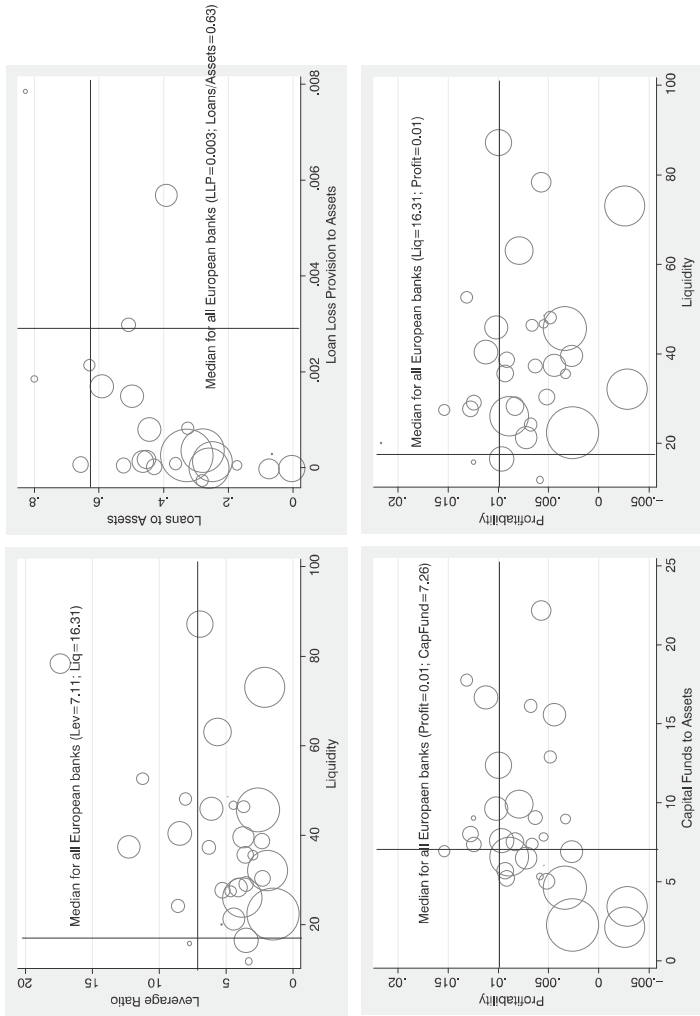
t – years \in (2007, 2010).

The results for the 36 largest banks in Europe were compared with the results averaged (median indicator) for 3 963 banks in Europe, which should help find an answer to the question whether, in fact, an entity size generates a higher risk. The research was conducted on the basis of the financial statements of commercial banks available in the *Bankscope* database, for the years 2007 and 2010. It should reveal the variability of risk indicators over time. The time analysis was chosen because of comparable activities of the largest banks at the time before the crisis (2007) and after the financial crisis (2010). To understand the study better and for an effective analysis, the results of the study are presented in a graphic form.

4. Results

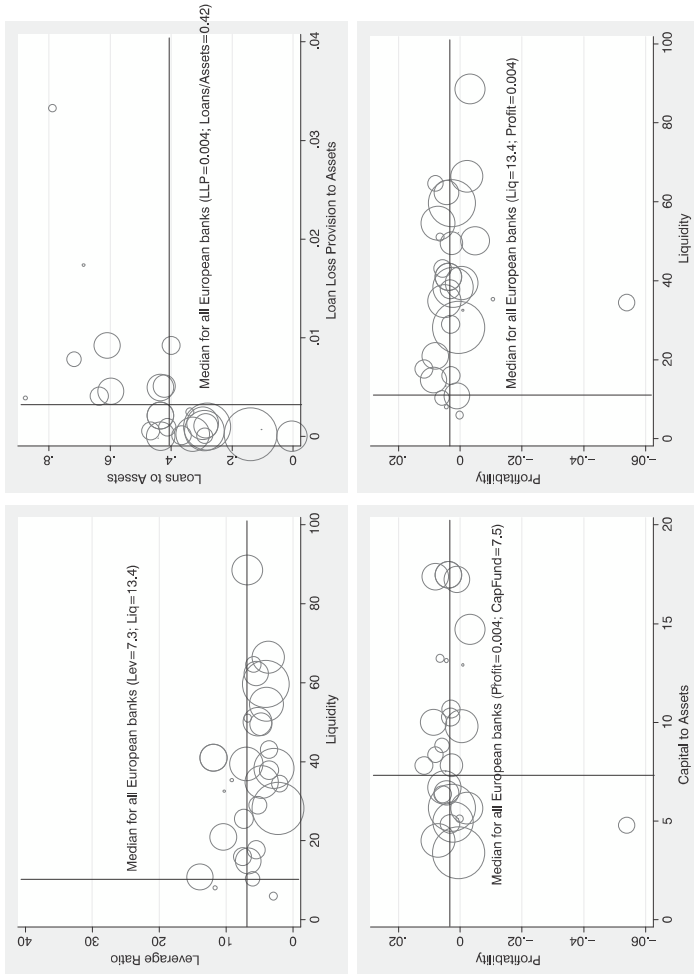
The analysis of indicators for the activity of the largest banks in Europe is presented graphically in Figure 1 for 2007 and Figure 2 for 2010. The results for the largest banks in Europe have been compared with averaged results for banks across Europe. Sometimes, the results are surprising. Calculations for all European banks gave the following results: Leverage Ratio = 7.11%, Liquid Assets/Total Deposits = 16.31%, Capital Funds/Total Assets = 7.26%, Loan Loss Provision/Total Assets = 0.003%, Loans/Total Assets = 0.63%, Profit before Tax/Total Assets = 0.01%. A detailed analysis of risk indicators of excessive debt, liquidity, capital adequacy and effectiveness of the largest commercial banks in Europe showed that they the risks taken by them do not differ from the average across Europe. It should also be noted that the inference is based on a sample of banks from *Bankscope* database, which may affect the correctness of the results. A similar study should be carried out for banks around the world.

On the basis of *Bankscope* database, in most cases the Leverage Ratio for large banks in Europe proved to be lower than the average for all European banks. A decreasing trend prevailed despite the crisis from 2008 to 2009. This phenomenon shows that the largest banks in Europe did not take excessive leverage risks before the crisis. Similar results were obtained for the Liquid Assets Deposits indicator – the biggest banks have greater resources of liquid assets in relation to the accepted deposits than an average bank in Europe. It is difficult to indicate excessive exposure to liquidity risk of the largest banks. After the period of crisis, the liquidity of banks also increased, which suggests that banks could have problems with liquidity during the crisis. Liquidity transformation and allocation of credit create a system-wide risk that would also be present in a system without SIFIs. The comparison of the liquidity ratio of banks and their performance proved that the classical principle of “the lower liquidity, the higher the profitability of a bank” holds true. The value of the indicator of profitability in 2007 showed significant variations across Europe (see Figure 1), which definitely changed in 2010 (see Figure 2). The bank’s profitability decreased from 0.01 to 0.004.



Notes: 36 largest banks in Europe. The area of a symbol corresponds to a bank's average assets. Leverage ratio=Equity/Total Assets, Profitability=Profit before tax/Total Assets, Liquidity=Liquid Assets/Deposits. The horizontal and vertical lines present the median value of a particular ratio for all European banks in 2007.

Figure 1. Analysis of indicators of the activities of the largest banks in Europe in 2007. Source: author's calculations based on Bankscope data (2012).



Notes: 36 largest banks in Europe. The area of a symbol corresponds to a bank's average assets. Leverage ratio = Equity/Total Assets, Profitability = Profit before tax/Total Assets, Liquidity = Liquid Assets/Deposits. The horizontal and vertical lines present the median value of a particular ratio for all European banks in 2010.

Figure 2. Analysis of indicators of the activities of the largest banks in Europe in 2010. Source: author's calculations based on Bankscope data (2012).

It is also clearly visible that the crisis affected the alignment of the profitability ratio and made profits of the largest banks closer to the average for the whole Europe. It is difficult to agree with the statement that the largest banks in Europe achieve superior returns by taking excessive risk of insolvency or liquidity. It seems that the scale effect does not significantly affect the efficiency of the largest banks. Taking into account the profitability of the largest banks in the light of their risk of default (expressed as Capital Funds/Total Assets Ratio), it can be noted that in 2007 the phenomenon was characterized by a great diversity (see Figure 1, bottom left-hand Chart). The largest banks in the research group had the Capital Ratio below the average in Europe. This situation can turn into anxiety due to the risk of insolvency of major financial institutions and a threat to security of the entire financial system. It is important that the sample did not include banks with above-average profitability and low ratio of equity to total assets. It should be noted that the threat of insolvency caused by the financial crisis brought no improvement – in 2010, little changed in the level bank security. An analysis concerning lending activities of banks showed that it declined in the largest banks in the period 2007–2010 from 63% to 42%. The largest banks had Loans to Total Assets Ratio that is below the average for the whole of Europe. What is also worth noting is the increase in the permission for LLP risk in both major banks and across Europe (see Figure 2, top right-hand Chart).

In conclusion, the study showed that the risk taken by the largest banks in Europe is not higher than in other banks. Therefore, we should pay special attention to smaller banks which, operating in a group, may contribute to the instability of the sector. By comparing the results with the averages for the whole Europe, in terms of liquidity risk, leverage, and profitability, these banks were characterized by relative safety. Thus, a more important aspect may be the risk of substitutability of their services and international relations, in the light of the potential danger of bankruptcy of one of the largest banks.

5. Conclusions

Given the methodology of the activities undertaken by the Financial Stability Board, its application only to the largest banks included in the SIFIs list should be brought into question. It seems that scenarios concerning economic repercussions for the system should also include insurance companies, investment and pension funds, or other entities which, according to the above categories, may be a source of systemic risk. It should be considered whether the publication of systemically important entities would not draw attention of investors and supervisors to smaller entities being able to disrupt the financial system. In the light of this study and based on Bank-scope data, the risk taken by the largest banks in Europe is not essential.

The basis for the regulations limiting systemic risk is to understand the nature and sources of SIFI instability. The advantage of the methodology developed by the Basel Committee should be mobilizing financial institutions to change their risk profile and business models in a way that reduces instability of the financial system globally. A financial institution's contribution to systemic risk is generally reflected in its liabilities to the rest of the system, i.e. to other financial institutions, and in its possible impact on asset and credit markets. It thus captures how important an institution is for the deposit system and how vulnerable it is to a systemic shock.

References

- Acharya, V.V. and Richardson, M. (2009). *Restoring Financial Stability. How to Repair a Failed System*. New Jersey: Wiley Finance.
- BIS. (2011). Global systemically important banks: assessment methodology and the additional loss absorbency requirement. Rules text. Basel: Basel Committee on Banking Supervision. November 2011.
- BIS. (2013). Principles for effective risk data aggregation and risk reporting. Basel Committee on Banking Supervision. January.
- Brunnermeier, M. et al. (2009). The Fundamental Principles of Financial Regulation. *Geneva Reports on the World Economy*, 11. Geneva: International Center for Monetary and Banking Studies.
- Cihák, M., Muñoz, S. and Scuzzarella, R. (2011). The Bright and the Dark Side of Cross-Border Banking Linkages. *IMF Working Paper No. 11/186*.
- Cornett, M., McNutt, J., Strahan, P. and Tehranian, H. (2010). Liquidity Risk management and Credit Supply in the Financial Crisis. Working Paper.
- Demirgüç-Kunt, A. and Huizinga, H. (2011). Do we need big banks? Evidence on performance, strategy and market discipline. *CEPR Discussion Papers*, 8276.
- EMEA, Centre for regulatory and Strategy. Addressing the risk posed by systematically important banks? The end of too big to fail? Deloitte Report 2014.
- European Commission. (2012). EU framework for bank recovery and resolution. June. Financial Stability Board. (2012). Resolution of Systemically Important Financial Institutions.
- FSB, IMF, BIS. (2009). Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations. Report to G20 Finance Ministers and Governors, Financial Stability Board, International Monetary Fund, Bank for International Settlements. October.
- Karkowska, R. (2013). Czy rynek repo może stać się przyczyną kolejnego kryzysu?, *Prace i Materiały Wydziału Zarządzania Uniwersytetu Gdańskiego*.
- Erkki, L. (2012). High level Expert Group on reforming the structure of the EU banking sector. Bank of Finland. October.
- Mayer, T., Möbert, J. and Weistroffer, Ch. (2010). Macroeconomic imbalances and the Eurosystem. *Global Economic Perspectives*. Deutsche Bank. June 2011.
- Weistroffer Ch. (2011). Identifying systemically important financial institutions (SIFIs). *Deutsche Bank Research*.

Appendix 1. Analysis of indicators of the activities of the largest banks in Europe in 2007, based on the database Bankscope

Bank name	Country name	Average Assets	Capital Funds/Total Assets	Leverage	Liquid Assets/Deposits	Loans/Total Assets	LLP/Total Assets	Profit before Tax/Total Assets
Deutsche Bank AG	GERMANY	2 380 301 056	2.27	1.50	22.45	0.33	0	0
BNP Paribas	FRANCE	1 679 249 920	4.65	2.63	45.65	0.28	0	0
UBS AG	SWITZERLAND	1 414 399 360	2.13	2.13	73.01	0.26	0	0
Société Générale	FRANCE	1 394 032 768	3.45	1.90	32.1	0.25	0	0
Royal Bank of Scotland	UNITED KINGDOM	1 376 651 008	6.59	3.81	26.11	0.4	0	0.01
HSBC Bank plc	UNITED KINGDOM	849 587 264	6.02	4.90	48.56	0.36	0	0.01
Raiffeisen Centrobank AG	AUSTRIA	849 587 264	6.51	5.33	20.11	0.06	0	0.02
ING Bank	NETHERLANDS	669 304 384	9.93	5.64	63.08	0.27	0	0.01
Crédit Agricole S.A.	FRANCE	590 790 528	12.38	6.97	87.15	0	0	0.01
Lloyds TSB Bank Plc	UNITED KINGDOM	527 250 080	7.63	3.51	16.49	0.74	0	0.01
Banco Bilbao Vizcaya Argentaria SA	SPAIN	482 156 192	9.64	6.09	45.98	0.59	0	0.01
Banco Santander SA	SPAIN	477 009 120	16.69	8.48	40.39	0.44	0	0.01
Intesa Sanpaolo	ITALY	449 784 192	15.59	12.27	37.46	0.5	0	0
Danske Bank A/S	DENMARK	421 235 200	6.51	4.41	21.30	0.46	0	0.01
Commerzbank AG	GERMANY	418 591 200	6.92	3.68	39.57	0.39	0.01	0
UniCredit	ITALY	341 399 968	22.18	17.39	78.44	0.08	0	0.01
KBC Bank	BELGIUM	296 706 752	7.54	4.10	28.28	0.45	0	0.01
Allied Irish Banks	IRELAND	232 846 304	5.72	3.55	35.60	0.51	0	0.01
Skandinaviska Enskilda Banken AB	SWEDEN	212 935 632	5.04	2.30	30.31	0.43	0	0.01

Bank name	Country name	Average Assets	Capital Funds/Total Assets	Leverage	Liquid Assets/Deposits	Loans/Total Assets	LLP/Total Assets	Profit before Tax/Total Assets
Bank of Ireland	IRELAND	209 866 688	5.22	2.33	38.77	0.42		0.01
DNB Bank ASA	NORWAY	208 674 624	8.05	5.25	27.72	0.66	0	0.01
Svenska Handelsbanken	SWEDEN	204 869 488	7.39	3.50	29.05	0.52	0	0.01
Banca Monte dei Paschi di Siena	ITALY	167 369 648	9.07	6.27	37.32	0.51	0	0.01
Standard Chartered Bank	UNITED KINGDOM	157 282 496	16.15	8.59	24.22	0.3		0.01
Swedbank AB	SWEDEN	138 467 840	7.41	3.70	46.44	0.36	0	0.01
Nordea Bank AB	SWEDEN	135 370 960	17.77	11.26	52.72	0.28	0	0.01
Erste Group Bank AG	AUSTRIA	128 891 944	12.90	8.04	48.12	0.33	0	0
Banco Popular Espanol SA	SPAIN	108 494 768	6.93	4.69	27.56	0.63	0	0.02
Dexia Banque Internationale	LUXEMBOURG	86 529 216	8.99	3.02	35.48	0.17	0	0
SNS Bank	NETHERLANDS	71 263 064	7.84	4.46	46.73	0.48		0.01
Barclays Bank S.A.	SPAIN	40 551 892	5.34	3.30	11.82	0.8	0	0.01
Banca Popolare Commercio e Industria	ITALY	16 326 954	9.05	7.75	15.88	0.83	0.01	0.01

Source: author's study based on Bankscope.