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Identifying systemically important financial institutions (SIFIs)

As part of the search for an adequate response to systemic risk, policy makers seek to identify financial institutions whose viability is crucial for the smooth functioning of the financial system. Institutions are viewed as systemically important if they are large, highly interconnected and unable to exit the market without causing major disruptions.

System-wide risk cannot be easily located at a small group of individual institutions. Systemic interdependencies are an integral part of a differentiated financial system, where various intermediaries fulfil different functions. Liquidity transformation and the allocation of credit create system-wide risk that would also be present in a system without SIFIs.

Focussing on banks as the primary source of systemic risk may prove short-sighted. Hedge funds, insurance companies, other non-bank financials, but also market infrastructures, all contribute to the smooth functioning of the economic and financial system and can become systemically relevant.

The methodologies used to *identify* SIFIs are not necessarily suited to *incentivise* them for regulatory purposes. In particular, the methodologies used need to be designed to reduce moral hazard and system-wide risk. Incentivising financial institutions to become merely less significant on the basis of the criteria currently under discussion, e.g. by lowering cross-border exposure, could distort the competitive landscape and potentially raise overall risk for the financial system.

Resolvability in case of failure should be a key criterion in the benchmarking of SIFIs. Measures to enhance resolution and bail-in within resolution regimes can effectively reduce moral hazard associated with the too-big-to-fail problem. The likelihood that the institution would be resolved or restructured in an orderly procedure if it were to fail should also be a central theme in the benchmarking of SIFIs. If that were ensured, all other indicators would carry far lower relevance.

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1. Introduction

Based on the experience of the recent financial crisis that started in 2007, policy makers are working on a new regulatory framework to address systemic risk. Their aim is, inter alia, to identify financial institutions whose viability is crucial for the smooth functioning of the financial system overall. So called SIFIs are systemically important financial institutions that are large, highly interconnected and unable to exit the market without causing major disruptions. Designated institutions are potential candidates for tighter supervision and additional loss absorbency requirements further down the road.

While new policies are still under discussion, it is clear that the indicators and methodology used to identify systemically important institutions will be key in promoting a more stable financial system. In this context, two different concepts need to be distinguished: 1.) The mere identification of systemically relevant institutions and market infrastructures and 2.) the benchmarking of banks and non-bank financials for regulatory purposes. The difference between the two concepts is most obvious when considering a financial institution's global activity. A globally active bank may have a larger footprint on the global economy than a local institution. However, a financial system which provides incentives for banks to reduce cross-border exposure need not be more stable than one that fosters cross-border diversification.

In this study we discuss the analytical framework for identifying and benchmarking systemically important financial institutions. First, we lay out the main concepts underlying the SIFI definition. Next, we turn to the methodologies used for measuring systemic importance in academia and for policy purposes. One by one, we go through the different categories as proposed by the Basel Committee on Banking Supervision (BCBS) for identifying global systemically important banks (G-SIBs). Finally, we give a brief overview on how non-bank financials and market infrastructures can be included in the SIFIs framework.

What is a SIFI?

Although there is no commonly accepted SIFI definition, policy makers generally consider institutions as systemically relevant that cannot exit the market without causing major disruptions to the financial system. According to this definition, systemic relevance depends on the institution's potential for destruction. The more destructive power an institution has upon failure, the more relevant it is for the system. The alternative view defines systemic relevance as a positive: Financial institutions are systemically relevant if their viability is crucial for the smooth functioning of the wider financial system. This definition stresses the (positive) contribution of an institution to a general public good.

Indispensable for the financial system or avoidable evil?

Both views represent two sides of the same coin: Are SIFIs necessary and indispensable for the financial system? Or are they potentially dangerous, the result of an unguided market process? In the second case, the adequate response would be to incentivise financial institutions to become less relevant. In the first case, it would be to ensure survivorship of those institutions deemed indispensable for the financial system. Reflecting on the desired structure of the financial system overall will help shape the corresponding policy response.

Basic concepts to identify SIFIs

An institution's contribution to systemic risk

To our knowledge, there is no consistent theory of SIFI regulation, but rather a number of methodological and empirical concepts that coexist in a loose manner. A counterfactual thought experiment may help to determine whether a particular institution should be regarded as systemically important or not. To this end, a common approach presupposes that a particular financial institution fails. It then assesses the possible fallout for the rest of the system.[1] The intuition behind this approach is as follows: When a financial institution fails, it defaults on its liabilities and/or triggers asset fire sales. The ensuing losses to the rest of the financial system through first, second or third round effects will be regarded as the institution's contribution to systemic risk. Third round effects – in our wording – refer to spill-over stemming from uncertainty or reassessment of financial risk; whereas first and second round effects arise from direct and indirect exposure to the failing institution. 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.

Its participation in a systemic event

The alternative approach assumes that a large shock hits the financial system, e.g. the bust of a property market bubble. It then considers to which extent a particular institution participates in a systemic event that follows suit. If losses to a particular institution are large – relative to overall losses – such an institution will be viewed as systemically relevant. Participation in a systemic event is determined by the expected loss the institution is likely to cause to its non-bank creditors.[2] It thus captures how important an institution is for the deposit system and how vulnerable it is to a systemic shock. The likelihood of participating in a systemic event is, inter alia, determined by an institution's credit exposure to other financial institutions and its leverage. Table 1 summarises the two approaches and relates them to the corresponding risk indicators and policy objectives.

	Contribution to systemic risk	Participation in systemic event
Concept	Marginal distress of the system, conditional on the institution failing	Expected participation of the bank in a systemic event; losses to the bank creditors
Risk indicators	— Intersystem liabilities — Liquidity and maturity mismatch — Transparency and resolvability	— Asset correlations — Leverage — Risk bearing capacity
Policy objectives	— Contain systemic impact upon failure — Avoid moral hazard	— Ensure survivorship in systemic event

The table distinguishes between the contribution and participation approach. Both concepts are reflected in different policy objectives summarised in the first row. The second row lists possible indicators to measure systemic relevance. Of course, policy objectives and indicators are not exclusively linked to either one of the concepts.

Source: DB Research 1

[1] Borio and Tarashev (2011) refer to this as the "bottom-up approach". A "top-down approach" would consider the expected loss (or value at risk) of the system – with and without a particular institution being part of it. The marginal difference of the risk measure is then interpreted as the institution's contribution to systemic risk.

[2] Ibid.

The case for regulating SIFIs

The case for regulating systemically important firms can be rationalised as follows:

Banks and other financial institutions pay a premium for their own default risk but are generally not charged for the possibility that their failure can create problems in other parts of the system. In other words, contagion effects upon failure – i.e. through direct credit links, increased uncertainty regarding mutual exposures, or forced asset sales – create externalities that are usually not borne by the institution causing them.

Some institutions create more externalities than others. Those institutions cannot exit the market without causing major disruptions to the wider financial system. As a consequence, they are viewed as too important to be allowed to fail – which, in turn, gives rise to moral hazard concerns. To the extent that creditors of SIFIs can expect to be bailed-out in case of failure, debt financing of these institutions enjoys an advantage over equity financing.

At least two consequences follow from this: On the one hand, competition is distorted between institutions that are regarded as too important to fail and those that are not. On the other hand, institutions that enjoy implicit public guarantees not only have an incentive to lever-up, but also to maintain or raise their level of systemic relevance. Both effects tend to increase fragility of the financial system overall.

From an analytical perspective, the contribution approach seems to be better suited to determine systemic relevance of individual institutions. It can be used to identify those institutions that create negative externalities and contribute more strongly to system-wide risk than others (see box “The case for regulating SIFIs”). However, depending on the policy objective, it is useful to also consider participation in a systemic event, because, once a crisis hits, it is participation and hence survival of systemically relevant institutions which matters to the functioning of the financial system and the economy overall. Both views complement each other and should be taken into account when forming policy responses.

The reference system

The failure of a financial institution most likely will have some effect on its owners, creditors, debtors and other market participants. To what extent these effects can be judged systemically relevant depends on the chosen reference system. The distinction between local and global SIFIs provides an illustrative example of how different reference systems can lead to different policy conclusions regarding an institution’s systemic relevance. If the chosen reference system is world financial markets, supervisors may view a local institution, i.e. one which does not operate in foreign markets and is funded purely domestically such as the Japanese Post Bank, as not systemically relevant, even if the institution is of considerable size. Judged against the domestic financial system, the same institution might well be considered systemically important.

The same holds true for the identification of the relevant group of firms and individuals that may all be affected if the institution fails. Is it only the banking system, the wider financial or the overall economic system that should be considered? The answer to this question determines not only how systemic relevance of individual institutions should be judged, but also which institutions should be included in the overall SIFIs universe.

Market environment

Recent crisis episodes have demonstrated that the relevance of individual institutions is also a function of the current market and general economic environment. Under adverse external conditions, which are almost always present in a systemic crisis, it is difficult to distinguish SIFIs from institutions that pose no potential threat to the system. In particular, the line between local and global can become blurred if second and third round effects are taken into account. Third round effects – in our wording – refer to spill-over stemming from uncertainty or reassessment of financial risk; whereas first and second round effects arise from direct and indirect exposure to the failing institution.

Local institutions, too, can become relevant for the global system

In light of experiences made during the recent financial crisis, a run on a local institution may well trigger a systemic crisis on a global scale. Take the case of Northern Rock in the UK, an institution which by most standards would not be considered a global SIFI. During the crisis, funding difficulties in wholesale markets led to a run on retail deposits which threatened to spill over from Northern Rock to other (domestic) banks. A default of Northern Rock would certainly have affected the British banking system overall and thus other banks that are active in the British market, including foreign banks. Policy makers were well-advised to prevent a panic in this situation which could easily have spread to other countries.

A similar case can be made by considering current banking sector problems in the smaller, highly indebted euro area countries. In a situation where fears of capital flight are present, the failure of a domestic institution, say in Greece, could have severe consequences for the European banking system as a whole. Under these circumstances, rather small events of perceived local relevance can easily turn into a systemic crisis, making it difficult to identify systemically important institutions ex ante.

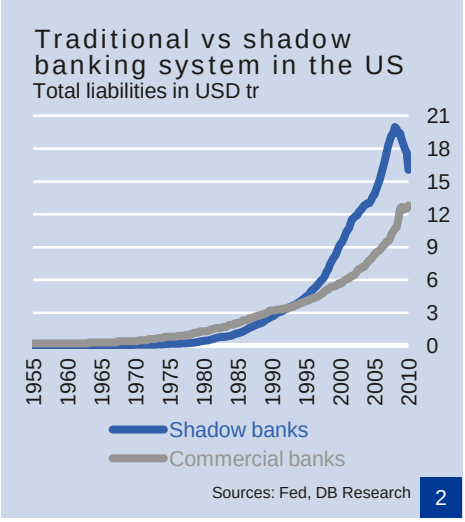
Systemic relevance of non-bank financials

Non-bank financials, too, contribute to systemic risk

Policy makers are often keen to emphasise that the financial system has a primary role in serving the financial needs of the real sector, i.e. corporates and households. From a public policy perspective the objective is to ensure that the financial system as part of the wider economic system is able to fulfil its functions. Securities houses, insurance companies, investment funds but also providers of market infrastructure, all contribute to the smooth functioning of the economic and financial system and can thus become systemically relevant if certain criteria are met. But also institutions outside core financial markets, such as public guarantors or government sponsored entities, should be viewed as systemically relevant if their failure poses a threat to the stability of the financial system.

The net should be cast sufficiently wide

Therefore, the net should be cast wide to include every institution that poses a potential threat for the functioning of the financial system. Take the case of US money market funds. The asset side of these institutions consists to a large extent of systemically relevant claims, i.e. short-term claims on the financial system mainly in the form of commercial papers. To the extent that money market funds promise to pay their investors at par, they face solvency risk. Although money market funds do not engage in maturity trans-formation, they are inherently fragile and can become prone to bank-run-like phenomena if the value of securities held falls below par (i.e. “breaks the buck”), as happened in 2008. Hedge funds provide another example, which according to the criteria proposed by the BCBS (see below pp. 10-13) show several traits of systemic relevance. Hedge funds invest to a large extent in assets for which market values cannot be observed and which cannot easily be liquidated if necessary. If a fund faced solvency problems, forced fire sales could drive asset prices down, possibly affecting other institutions. Systemic risk can also emerge from the funds’ liabilities side. Often, hedge funds are highly leveraged, exposing the banking sector to substantial credit risk.[3]



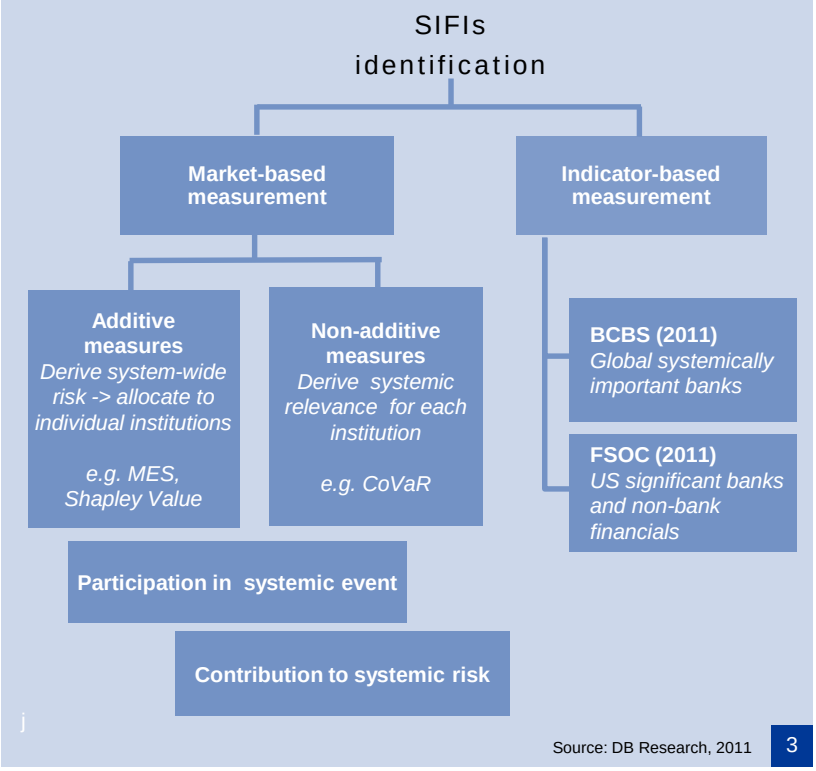
If policies focus too narrowly on the banking sector, it is likely that systemic risk builds up in the very sectors excluded from supervisory scrutiny. The increase in liabilities of the so-called shadow banking system in the US – whose cumulative assets by now exceed those of commercial banks – can be interpreted in that way (see chart 2). Also, the rise and fall of AIG (American International Group) provides an illustrative example. Backed by a superior rating and without a systemic risk supervisor in charge, AIG engaged heavily in the CDS market writing protection against default of other financial institutions. AIG thus contributed to the build-up of systemic risk and eventually became highly vulnerable to a systemic shock itself. The example of AIG highlights the necessity to include *all* potential candidates in the SIFIs universe. Although different institutions are subject to different regulatory and

[3] Elliot and Litan (2011) provide further examples of how non-bank financials may contribute to systemic risk.

supervisory regimes, the concepts to determine systemic importance in principle apply to banks and non-bank financial institutions alike.

Measuring systemic importance

Mainly as a direct response to the current regulatory debate, the literature on how to measure systemic importance is growing rapidly. Two basic approaches can be distinguished: On the one hand, researchers use regression techniques to extract information from market prices – sometimes based on rather complex financial models. On the other hand, policy makers pursue a more hands-on approach. For the sake of usability, they tend to prefer an indicator-based approach which does not rest on markets assessment but incorporates bank-level data, i.e. balance sheet data, volume of transactions etc. The chart below provides a first overview of the different approaches.



Source: DB Research, 2011

Market-based measurement of systemic importance

The academic approach has so far focussed on market-based measures of systemic importance in a portfolio context (see box "The academic approach to measuring systemic importance"). The models used are based on asset price correlations and other market-based risk measures, such as VaR (Value at Risk) or MES (Marginal Expected Shortfall). In some cases, they also incorporate data on leverage or interbank claims and liabilities. Two broad strands can be distinguished: On the one hand, researchers allocate systemic risk in an additive manner, i.e. by deriving measures of system-wide risks and allocating them to individual institutions subsequently (e.g. MES and Shapley Value). On the other hand, in a non-additive manner, measures are based on the expected shortfall or Value at Risk of the system, conditional on the default of a particular bank (see above, chart 3).

The academic approach to measuring systemic importance

There are a number of different concepts that aim to attribute systemic risk to individual institutions. Among the most prominent attempts are the following:

Conditional Value at Risk (CoVaR)

CoVaR is defined as the value at risk (VaR) of the financial system conditional on institutions being in distress. Systemic risk contribution is defined as the difference between CoVaR conditional on the institution being in distress and CoVaR in the median state of the institution.

— Adrian and Brunnermeier (2010)

Marginal Expected Shortfall (MES)

MES is defined as the expected loss experienced by each firm when aggregate losses are large. By also considering leverage, the Systemic Expected Shortfall (SES) can be estimated, where SES increases with leverage and MES.

— Acharya (2009)
— Acharya et al. (2009, 2010)
— Brownlees and Engle (2010)

Shapley Value

A game-theoretic instrument, the Shapley Value assesses how important each player is to the overall system and what payoff the player can expect from cooperation. The proposed measure attributes the overall (system-wide) risk to each institution on the basis of its average contribution to the risk of all the sub-groups in which it participates.

— Tarashev et al. (2010)
— Gauthier et al. (2010)
— Liu and Staum (2010)
— Drehmann and Tarashev (2011)

Further approaches

Further approaches include measures derived from network models, the probability that a bank fails conditional on other banks failing, or the calculation of a fair insurance premium for systemic risk in a portfolio context.

— Segoviano and Goodhart (2009)
— Huang et al. (2009, 2010, 2011)
— Zhou (2009)
— Chan-Lau (2010)

Although market-based measures of systemic importance have their role in risk monitoring and supervision, they share a number of traits that make them less suitable as supervisory benchmarks. First, market-based indicators are not available for all financial institutions, as only a part of financial institutions is publicly listed and traded on a regular basis. Second, market-based indicators are not stable over the cycle. During tranquil times, they may understate systemic effects and overstate them during crisis times. Finally, market-based measures anticipate current or future policy actions to the extent that systemically important institutions may be viewed as better supervised or more likely to be granted public assistance in times of distress.

Indicator-based measurement of systemic importance

Supervisory authorities tend to prefer indicator-based approaches and use market-based measures mainly as a cross-check. Indicator-based measures have the advantage that they can be applied more universally across listed and non-listed institutions. They are also more robust than market-based measures that rely on a limited number of rather volatile indicators. An important drawback is the inability of indicator-based measures to differentiate between an institution's systemic risk contribution and its participation in a systemic event. Moreover, indicator-based approaches require a somewhat arbitrary choice of the indicators, composition of the peer group and definition of weighting and threshold schemes.

Indicator-based approaches are also more transparent and thus easier to trace by the affected institutions. From a policy perspective this may be of advantage if the primary goal is to nudge designated institutions into becoming less systemically relevant. To this end, the indicators give clear guidance to the affected institutions in which areas they can reduce exposure, or change their way of doing business, so that the supervisor will view them as less relevant. However, similar to external solvency ratings there is a trade-off between transparency of the methodology and the possibility that rated institutions start "gaming the rules", i.e. by reducing exposure in the areas that feed into the rating, while increasing exposure in others. This may be one of the reasons why regulators prefer to have some discretion in the rating process and use a relative benchmark approach, where systemic relevance is determined not only by the actions of the institutions themselves but also by the actions of others (see box "The supervisory approach to measuring systemic importance").

The supervisory approach to measuring systemic importance

Indicators used to identify systemically important financial institutions for supervisory purposes are generally derived from on- and off-balance sheet items, such as total assets, interbank claims or liabilities.

Systemic importance is measured in relative terms, i.e. relative to the reference system. To this end, it is necessary to define a reference group against which the value of the systemic risk indicator can be benchmarked. The reference group can either be determined by common characteristics the institutions share, e.g. size and interconnectedness, or by participation in a certain market in which the respective institutions are active.

The resulting indicator is then expressed as the rank of a particular institution among its peer group members or as a volume share relative to the referenced market or peer aggregate. Composition of the benchmark group is revised on a regular basis and adjusted if necessary.

A joint report issued by the IMF, BIS and FSB (2009) provides guidance to the G20 finance ministers of how systemic importance of financial Institutions, markets and instruments can be assessed. In a further document, the FSB (2010) offers recommendations to the authorities for developing suitable assessment methodologies.

Benchmarking financial institutions

Need to distinguish between identification and benchmarking

In this chapter we discuss indicators used to benchmark systemically relevant institutions. Conceptually, this is decisively different from the mere identification of SIFIs. While both concepts are closely interrelated, the methodology used for benchmarking financial institutions in addition needs to take policy objectives and incentive effects into account.

If the primary goal is to incentivise financial institutions to become less systemically relevant, the indicators should be designed to capture risk contribution. In order to be incentive compatible, the indictors should be measurable and difficult to manipulate; they should be determinable by the financial institution's management and display relatively low volatility – so as to reflect strategic

decisions rather than day-to-day market fluctuations. If the primary goal is to make the system safer, the indicators should in addition capture how likely an institution is to participate in a systemic event.[4]

It's the policy objective that matters!

An effective benchmarking of financial institutions makes sure that the indicators used are in line with the respective policy objectives and tools to be applied. To illustrate this point consider the following case: Imagine a central counterparty (CCP) which is highly interconnected and whose failure would disrupt the smooth functioning of derivatives markets. Such an institution would be judged systemically relevant according to the contribution approach. In extremis, a policy maker that merely tries to minimise an institution's contribution to systemic risk by looking at its interconnectedness could decide to abolish the CCP altogether. For obvious reasons, this would not be a sensible way to deal with this particular form of system-wide risk. After all, CCPs are meant to reduce complexity in the OTC market and thereby enhance stability of the system. In this case, it will be important to know not only to which extent the CCP contributes to systemic risk but also to which extent it would be affected by a system-wide shock. The corresponding policy objective would be to ensure survivorship of the CCP and would call for sufficient collateralisation and capitalisation of the institution (for an overview of different policy options, see box "Policies to deal with SIFIs").

By contrast, consider an industrial company which engages in the selling of Credit Default Swaps (CDS) and other derivatives on a large scale but does not have an adequate credit risk management in place to deal with the resulting risk. In order to enhance stability of the system, it may not suffice to look at the institutions viability in a systemic crisis but also to consider its contribution to systemic risk by looking at its derivatives liabilities. In this case, the policy objective could be to disincentivise the company to engage excessively in the selling of derivatives.

The examples show that indicators used *to identify* systemically relevant institutions need not necessarily be suited *to benchmark* institutions for regulatory purposes. Furthermore, the examples highlight the fact that systemic relevance is linked to the respective policy objective. In some cases, it may be desirable to have institutions assuming a systemically relevant role as this increases stability of the system overall, in others, it may not.

Side effects

Creating a seal of quality for SIFIs

In addition to the desired effect of incentivising financial institutions to become less systemically relevant, further (unintended) effects need to be considered. For instance, the market may view designated SIFIs as less risky and demand a lower risk premium – not necessarily because SIFIs may be required to hold higher capital buffers, and not because investors can expect to be bailed-out, but because SIFIs can be expected to be under closer scrutiny from supervisors and the general public. Banks that bear the "SIFIs label" might not only pay a lower risk premium on their bonds, they

Policies to deal with SIFIs

Policy makers have a wide range of tools available to address the SIFIs dilemma. As a first best solution, policy makers can try to eliminate externalities created by SIFIs by ensuring a full bail-in of creditors and limiting contagion effects upon failure. Alternatively, they may opt to charge SIFIs for the externalities (e.g. through taxes) and increase the SIFIs' likelihood of survival (e.g. through capital requirements). As a last resort, they may choose to restrict SIFIs in their range of viable activities or abolish them altogether.

Eliminate externalities

- Provide for an orderly resolution mechanism that allows to maintain systemically important functions of the failing institution
- Provide for bail-in mechanisms so that creditors cannot expect to be bailed out
- Enhance market infrastructure to reduce the risk of contagion

Charge for externalities

- Charge levies according to systemic risk contribution
- Ask for additional capital and liquidity buffers

Increase likelihood of survival

- Increase capital and liquidity requirements
- Restrict leverage

Abolish SIFIs

- Limit the size and range of viable activities
- Break-up of systemically important financial institutions

[4] Bluhm and Krahnen (2011) argue that a bank's contribution to systemic risk is not necessarily a sufficient determinant of its optimal level of capitalisation, i.e. the capitalisation which optimises the system's resistance to shocks. Consequently, using risk contribution as the sole determinant can result in a sub-optimal allocation of capital within the system.

may also find it easier to attract deposits from corporates and households, especially in times of market tension.

Raising market entry barriers

Moreover, depending on the exact design of the measurement approach, the SIFIs regime may create effective barriers to entry into the market for global financial services. In markets where interconnection is unavoidable and a global network provides for a competitive advantage, non-SIFIs would face high incremental costs associated with entering this market and being forced to comply with SIFIs regulation. The existing SIFIs, which do not face the same entry costs, would be effectively protected from competitive pressures, inter alia depending on the actual regulatory burden.

Identifying globally important banks

The Basel criteria

Based on the recommendations by the Financial Stability Board (FSB) to reduce moral hazard posed by systemically important financial institutions, the Basel Committee on Banking Supervision (BCBS) has put forward a preliminary list of criteria according to which systemic importance should be identified. At the end of July 2011, the proposed methodology for identifying globally important banks (G-SIBs) was released for public consultation.

The methodology intends to capture systemic impact if a bank were to fail, not the probability of failure. Although the methodology has yet to be finalised, it is clear that indicators will fall into five categories. In addition to *size, interconnectedness* and *substitutability*, the BCBS lists *complexity* and *cross-jurisdictional activity* as relevant criteria. Indicators for each category are based on banks' on- and off-balance sheet items.

The proposed methodology assigns equal weights to each of the five sub-categories. Indicators are measured as a share of the aggregate value for the entire sample. More than 70 banks are included in the sample, 28 of which are classified as G-SIBs.

http://www.bis.org/publ/bcbs201.htm

In the following paragraphs we discuss the indicator-based measurement as proposed by the BCBS (see box "The Basel criteria"). Although the approach is crafted to identify globally important banks, i.e. financial institutions that are subject to *banking* regulation under the Basel definitions, the underlying concept can also be discussed in the context of identifying relevant *non-bank* financial institutions.

One by one, we go through the different criteria used to identify systemically relevant institutions, i.e. size, interconnectedness, global activity, substitutability and complexity. Indicators are judged on the basis of how well they measure risk contribution as well as which incentive effects they may create.

1. Size

The size of a financial institution is usually measured by the value of total assets held or the institution's market capitalisation. The Basel Committee proposes to measure size by the total exposure as defined for use in the Basel III leverage ratio. This allows considering non-balance sheet items in addition to on-balance sheet items. However, to use this measure on a comparable basis, distortions due to different accounting rules across jurisdictions would have to be eliminated at first.[5]

Size is the predominant theme in the measurement approach as proposed by the Basel Committee. Almost all variables are measured in absolute values rather than ratios (except for the wholesale funding ratio). The indicator is expressed as the institution's share of the sample's aggregate value. Thus, each indicator measures the size of a particular institution relative to its peers in the designated SIFIs universe. Depending on the actual regulatory burden, the methodology provides stronger or weaker incentives for financial institutions to reduce business volume – at least to a level where they will no longer be considered "too large".

Undoubtedly, size plays an important role in determining systemic relevance. If a large institution failed, the fallout for the rest of the system would likely be larger than it would be if a small institution were to fail. The larger an institution, the stronger, ceteris paribus, is its impact on the stability of the financial system overall. It is less obvious, however, whether the stability of the system can be increased by limiting the size of individual institutions. In fact, empirical evidence is mixed as to whether the costs of having large institutions outweigh the benefits. Maturity and liquidity trans-

[5] Moreover, the measure does not take account of the fact that exchange rate fluctuations affect the institutions' ranking, even if the institutions' underlying notional exposures have not changed.

Bank failures and bank size

	Number of failed banks 1960-2009	Deposits affected (USD bn)
Large banks (assets > USD 10 bn)	13	127*
Medium-sized banks (assets USD 1-10 bn)	166	354
Small banks (assets < USD 1 bn)	2,523	260

*excl. WaMu which was sold to JPM

Sample of 2,702 US bank failures

Sources: FDIC, DB Research 4

Assessing resolvability of financial institutions

Resolvability of a financial institution is determined by internal as well as external factors. Internal factors relate to the type of business, the funding and organisational structures of the institution. External factors include domestic resolution regimes that support the authorities in maintaining the critical functions of a failing institution. For internationally operation institutions, cross-border coordination and sharing of information plays also an important role.

In July 2011, the FSB released for consultation recommendations for an "effective resolution of systemically important financial institutions". Although the document primarily discusses how resolution regimes can be made more effective, it also contains some valuable thoughts on resolvability assessment.

Including resolvability as an overriding criterion in the assessment methodology would minimise competitive and other distortions and help align incentives with the aim of reducing moral hazard and increasing systemic stability overall. To this end, qualitative and quantitative factors should be considered which determine the likelihood that the institution would be resolved or restructured in an orderly procedure if it were to fail. Based on the FSB's proposed "resolvability assessment", the firm's structure and operations, its management information systems as well as national resolution regimes and tools should be considered.

http://www.financialstabilityboard.org/publications/r_110719.pdf

formation – as well as the allocation of credit risk – create systemic interdependencies that cannot be easily allocated to individual institutions. Systemic risk can also be present in a highly decentralised system with many small institutions.[6]

In a systemic crisis, it can be even more difficult to deal with the failure of small and medium-sized institutions than it is to stabilise a limited number of rather large institutions. Crisis management in a highly fragmented banking system may bind more capacities than the rescue of a single institution. Moreover, medium-sized institutions create significant uncertainty regarding their systemic relevance, as in the case of Lehman Brothers. Exceptional circumstances are almost certainly warranted in a crisis situation, which makes it nearly impossible to distinguish between systemically relevant and non-relevant institutions.

In order to align incentive effects of the measurement approach with the overall goal of reducing moral hazard greater emphasis should be given to resolvability as an overriding criterion (see box "Assessing resolvability of financial institutions"). Size is an important determinant of systemic relevance ex ante; however, it is the likelihood of an institution failing without causing systemic disruptions which should matter for policy purposes. Including resolvability as an overriding criterion in the assessment methodology would minimise competitive and other distortions and help align incentives with the aim of reducing moral hazard and increasing systemic stability overall.

2. Interconnectedness

Interconnectedness of a financial institution is generally measured by the volume of its intra-financial system assets and/or intra-financial system liabilities. The former reflects an institution's credit exposure to the rest of the system and determines its participation in a systemic event. The latter captures credit risk to the rest of the system and thus an institution's potential contribution to a systemic event. The Basel Committee proposes, in addition, to use the wholesale funding ratio, i.e. the share of funding raised from sources other than retail deposits in total liabilities.

Intra-system claims and liabilities are not a bad thing per se. They are an integral feature of a vertically differentiated financial system, where different financial intermediaries fulfil different functions. Intra-system claims and liabilities arise to the extent that some institutions specialise in the collection of funds from outside the system, e.g. deposit-taking institutions, money market funds etc., while others depend on whole-sale funding (e.g. investment banks). They also reflect claims and liabilities in the interbank funding markets and the sharing of credit risk between financial institutions. To a certain degree, interconnectedness and the risk of contagion go hand in hand with the benefit of having a differentiated financial system in which the allocation of risk and liquidity is organized by private markets.

To achieve the optimal level of intra-system dependencies it will be necessary to determine which claims and liabilities are classified as systemically relevant and which not. To this end, the definitions used should be as narrow as possible but as broad as necessary. The resulting incentive effects need to be considered. For instance, if

[6] The US savings and loan crisis provides a case in point. Here, correlated exposures among many smaller institutions created systemic threats even without an explicit role for large institutions.

Symbiosis of bank and state finances

In some highly indebted European countries, domestic banks have increased their exposure to the sovereign over the past years. This development has led to a symbiosis of bank and state finances, where states provide guarantee for their banks, while banks provide funding to states.

In Greece, Portugal and Ireland systemic relevance has increased not only of banks but also of the sovereign. As a consequence, the close links between banks and states has limited political options to restructure government debt outstanding without causing major disruptions to the financial system. The question arises whether banks should be discouraged to invest in domestic government bonds ex ante.

As long as state finances are sound, government bonds provide a rather safe and liquid asset. Banks use these assets mainly to manage their balance sheet position. However, in times of distress there is a moral hazard problem with having systemically relevant institutions fund sovereign debt. If local institutions enjoy (implicit or explicit) backing on a transnational scale, e.g. through the Eurosystem, they may be induced to provide political lending to their home sovereign. Even in the absence of political pressure, the fact that banks can fund themselves more easily and at lower cost than the sovereign creates incentive for banks to provide financing to the sovereign. The increase in sovereign exposures of banks in some highly indebted European countries can be interpreted in this way.

liabilities vis-à-vis insurers and pension funds were not included in the definition, incentives would be set to obtain funding from those institutions rather than from other banks. To prevent systemic risk building up outside the official banking sector, in particular, exposure to non-bank financials should be included in the definitions. Against the backdrop of debt sustainability issues in some highly indebted European countries, special consideration should also be given to claims and liabilities vis-à-vis the home country sovereign (see box "Symbiosis of bank and state finances").

3. Global activity

A financial institution's global activity is generally measured by its cross-border claims and liabilities. The Basel Committee proposes to use cross-jurisdictional claims and liabilities as a core measure and non-domestic revenues as an ancillary measure.

The general presumption is that globally active banks are a particular threat to the stability of the global financial system, whereas banks which are active only in their home market are not. Globally active banks are often larger than domestic banks and through their foreign funding exposure provide a further channel for contagion across national borders.

Global activity is a typical example of how the measurement of systemic relevance is not necessarily suited to benchmark financial institutions for regulatory purposes. Tying regulatory burden to cross-border claims and liabilities entails the risk of creating unintended side-effects. If, due to SIFIs regulation, banks faced higher marginal costs in their cross-border activities than their local competitors, global banks would easily be priced out of the market. Especially in the European context, this would counteract the idea of a single market for financial services. But also in the global context, it is not so clear why a system that provides incentives to reduce cross-border business should be more stable than one that fosters diversification across countries.[7]

On the contrary, globally active banks may be part of the solution rather than part of the problem. In light of the sovereign debt crisis in some EMU member states, large cross-border institutions can help form a more resilient banking system within the euro zone.[8] Globally active banks are not only able to better diversify country-specific credit risk but also to maintain a stable funding base, especially in times of distress. In so doing, they can continue to provide credit when local institutions are no longer able to meet corporate and private funding needs.[9] Recent experience in Spain has demonstrated that global banks can have a stabilising effect also on home markets. In Spain, globally acting banks were able to step in and continue to provide credit in a situation where national Cajas were hit hard by recession and the bust in Spanish property markets.

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[7] Cihák et al. (2011) argue that systemic resilience increases with cross-border interlinkages, at least up to a certain point. Past this point, resilience decreases again, until the financial network becomes close to complete and the system becomes even more resilient.

[8] Mayer et al. (2011) argue that a defragmented banking system within the euro-area has created a situation where local shocks can readily lead to intra-euro capital flight.

[9] Navaretti et al. (2010) find that lending of EU banks' foreign affiliates has been stable and even increasing between 2007 and 2009. For an in-depth discussion of the costs and benefits of cross-border banking within the EU, see also Allen et al. (2011). For a discussion of how cross-border banking has fared before, during and after the financial crisis, see Schildbach (2011).

Based on the arguments listed above, global activity may be used as an indicator to determine participation in the overall sample of global SIFI candidates, i.e. by distinguishing between local and global SIFIs. However, we doubt that incentivising financial institutions to become less globally active is suited to establish a more stable financial system.

4. Substitutability

Substitutability of a particular financial institution is particularly hard to measure. The Basel Committee proposes to use assets under custody, value of payments cleared and settled through payment systems, as well as values of underwritten transactions in debt and equity markets to measure substitutability. The measurement of substitutability in that way requires (a) a consistent definition of what constitutes a systemically relevant market and (b) the definition of a systemically relevant market share. In this respect, it is very similar to the concepts used in competition law.

Strong market position not to be mistaken for lack of substitutability

However, with the aim of ensuring a stable financial system, substitutability should not be misunderstood as a measure of market dominance. Even if a financial institution's market share or the value of transactions it processes is large, the institution may not be indispensible for the functioning of the system. The likelihood that the institution can exit the market without causing major disruptions should be assessed, rather than the mere volume of assets held or transactions processed. This requires a counterfactual analysis of what were to happen if a particular institution was no longer offering its services, not the mere assessment of market shares.

5. Complexity

Complexity generally relates to the corporate structure of an institution. It can also refer to the asset side of a financial institution's balance sheet – with more complex assets adding to the complexity of the financial institution. The Basel Committee takes this latter view and measures complexity by the notional value of OTC derivatives, level 3 assets for which no market value can be observed, as well as the value of assets held on the trading book or available for sale.

The use of complexity as a measure of systemic relevance rests on the notion that more complex financial institutions are more difficult to dissolve if they fail. More complex assets are harder to sell and more complex corporate structures more difficult to disentangle. In both cases, it is rather difficult to find adequate indicators. Complexity seems to be only one of the factors that determine the likelihood that a financial institution can be resolved without causing systemic problems.

Important to consider resolvability

With respect to the corporate structure, it would be important to consider resolvability as an overriding criterion to judge an institution's contribution to systemic risk. Besides other bank-specific internal and external factors that determine resolvability, complexity may be just one of the factors that need to be assessed. If an institution fails, it will be necessary that those parts of the business which are deemed systemically relevant on the asset- as well as liability-side can be isolated from the rest of the business on a going-concern basis.

On the asset side of bank balance sheets, it may be useful to consider excessive engagement in overly complex products. However, a certain degree of complexity of bank balance sheets is necessary for instance in the market for bespoke OTC derivatives.

Dodd Frank – SIFI designation

In the US, the Dodd-Frank Act designated all commercial banking groups with USD 50 billion or more in consolidated assets as SIFIs, but leaves the designation of systemically important non-bank financial institutions and bank holding companies with the Financial Stability Oversight Council (FSOC).

According to Dodd-Frank, the FSOC can designate a non-bank financial company for enhanced supervision if "material financial distress at such a firm, or the nature, scope, size, scale, concentration, interconnectedness, or mix of the activities of the firm, could pose a threat to the financial stability of the United States." Currently, the FSOC is in the process of formulating a methodology to identify systemically important *non-bank* financial institutions.

Besides hedge funds, money market funds and securities houses, the rules target financial subsidiaries of large (industrial) corporate, which have become quite large in the US and in some cases have threatened the existence of their parent companies.

A notice of proposed rulemaking from February 2011 defines a company as a non-bank financial institution, if either 85 % of gross revenues or 85% of gross assets are related to financial activities. As for bank holding companies, a threshold of USD 50 billion in total consolidated assets applies. The proposed definitions apply to domestic as well as foreign institutions. The Fed may designate further companies as non-bank financial institutions on a case-by-case basis.

http://www.federalregister.gov/articles/2011/02/11/2011-2978/definitions-of-predominantly-engaged-in-financial-activities-and-significant-nonbank-financial

Internationally Active Insurance Groups (IAIGs)

Following the FSB's recommendation on reducing moral hazard posed by SIFIs, the International Association of Insurance Supervisors (IAIS) has released a concept paper in July 2011, which lays out the framework for the supervision of Internationally Active Insurance Groups (IAIGs).

Internationally operating financial institutions that hold assets and/or insurance liabilities of more than USD 20 bn or gross written premiums of more than USD 10 bn will be subject to heightened supervisory scrutiny. There will be closer coordination and interaction between supervisors for these institutions and IAIGs will be required to meet additional requirements concerning risk management and contingency planning.

The final framework is scheduled to be in place by mid-2013. It is expected that the initial number of IAIGs will be limited to about 40 to 50 and increased thereafter.

http://www.iaisweb.org/__temp/ComFrame_Concept_Paper_Final.pdf

After all, it is the very role of financial intermediaries to assess and bear the risks that cannot easily be grasped and are *not* traded in public markets. The resulting complexity of assets held by banks is a natural consequence of this very function. It should be addressed by accounting and disclosure rules rather than SIFIs regulation.

Identification of non-bank SIFIs

We have already argued that the principles used to determine systemic relevance should be applied universally to all financial institutions in order to prevent systemic risk building up in sectors that are excluded from the SIFIs universe. However, any approach to measuring systemic relevance of individual institutions needs to take into account that different groups of financial institutions fulfil different functions within the financial system. Availability of certain balance sheet items or market information can furthermore vary between the different groups. It will be necessary therefore to tailor the measurement approach to the distinct characteristics of each group of financial institutions. In so doing, resolvability of a financial institution could serve as a central theme and an important criterion for designation of bank and non-bank financials alike. The likelihood of the institution being resolved or restructured in an orderly procedure if it were to fail, i.e. without causing systemic disruptions, should be considered as a central theme (see also box "Assessing resolvability of financial institutions" on page 11).

At the moment, regulators are developing methodologies to identify systemically relevant non-bank financials. The methodologies are still in the process of consultation. In the US, Dodd Frank has made specific reference to non-bank financials who can be designated as systemically important on the basis that material financial distress at such a firm would pose a threat to financial stability (see box "Dodd Frank – SIFI designation"). In so doing, Dodd Frank inter alia addresses systemic risk in the shadow banking system whose cumulative assets exceed those of commercial banks (see chart 2 on page 6).

In a similar vein, the FSB (2010) has assigned supervisors to develop methodologies for assessing systemic relevance of non-bank financials. In addition to banks and market infrastructures, special attention is given to insurance companies (see below and box" Internationally Active Insurance Groups (IAIGs)").

Insurers

Insurance companies view their core business as largely non-relevant for financial stability due to relatively low levels of interconnectedness with the rest of the financial system. In fact, direct intra-system claims and liabilities are limited, as insurers hold only a small fraction of their assets in bank debt and equity securities. Moreover, insurers are largely independent from bank financing. Only in recent years have they started to tap capital markets to fund their operations or transfer insurance risk to capital investors via insurance-linked securities (ILS). Overall volumes are still manageable, though.[10]

Insurers therefore aim to separate potentially systemically risky activities from their core business, arguing that only the former should fall under heightened supervisory scrutiny. Measured by total asset volume, however, the world's largest insurers play in the same league as the world's largest banks. Thus, resolvability of large

[10] For an overview of the ILS market, see Weistroffer (2010).

insurance companies cannot be taken for granted. The same principles used to identify systemically important banks should be applied also to identify systemically important insurers, i.e. assessing the systemic impact of an insurance company's failure, not the probability of failure.

Would it be possible from a systemic risk perspective to allow large insurers to default on their liabilities, leaving policy holders of casualty and property insurance but also of life and pension insurance without adequate coverage? How would financial markets react and what would be the effect on asset prices if a large insurance company were forced to exit the market? The answer to these and related questions should guide the methodology to determine systemic relevance of insurance companies.

Market infrastructures

Payment systems, securities settlement systems and central counterparties are all structures that connect individual market players in order to facilitate their mutual dealings. They provide intra-system channels for the transfer of money, securities and collateral. They are natural SIFI candidates, as a failure of one of the sub-systems simultaneously affects a large number of players in the market. Systemic problems can arise if the functions of the failing system are not transferred to another platform in a timely manner.

The critical role of market infrastructures has led policy makers to recognise the specific relevance of market infrastructures – already before systemic risk regulation for banks and other non-bank financials became an issue. The principles set out by international standard setting bodies for systemically important payment systems and systemically important securities settlement systems date back to several years before the recent crisis period (see box "Systemically important market infrastructures").

Following the experience made during the recent financial crisis, prudential policies explicitly advocate centralisation in market infrastructures – forcing more contracts to be cleared and inter-mediated by the platforms. Central collateralisation and central clearing of OTC derivatives has thus become one of the main pillars of the new regulatory framework, which aims to reduce systemic risk in financial markets overall. Such a policy tends to increase the systemic importance of market infrastructures. The net gain in overall stability of the financial system is believed to be positive, though.

In case of market infrastructures, systemic relevance needs to be accompanied by measures that ensure viability in a crisis event. To this end, it will be important to refer not only to loss-given-default, but also probability of default in the benchmark framework. Exposure to counterparties can be used to identify systemically important infrastructures, but benchmarking should rather be based on viability and resolvability issues.

Systemically important market infrastructures

At present, there are three sets of international standards by the CPSS and CPSS-IOSCO, i.e. the Core principles for systemically important payment systems (2001), the Recommendations for securities settlement systems (2001), and the Recommendations for central counterparties (2004). The standard setting bodies are currently working on a new set of principles that will replace the three existing sets. The new set is believed to provide greater consistency in the oversight and regulation of market infrastructures worldwide.

http://www.bis.org/publ/cpss94.htm

In the US, the FSOC designates financial market utilities as systemically relevant according to the following criteria:

— Aggregate monetary value of transactions processed by a financial market infrastructure

— Exposure to its counterparties

— Interdependencies with other financial market infrastructure or payment, clearing or settlement activities

— The effects that the failure would have on the broader financial system

A corresponding rule will come into effect by the end of August 2011.

http://www.federalregister.gov/articles/2011/07/27/2011-18948/authority-to-designate-financial-market-utilities-as-systemically-important

Conclusions

Mainly as a direct response to the recent financial crisis that started in 2007, policy-makers are developing a framework to deal with the too-big-to-fail problem in financial markets. A main building block of the new regime will be enhanced regulatory and supervisory requirements to be met by systemically important financial institutions. Currently, academics and policy makers are working on

methodologies to identify those institutions which deserve special attention in the new framework.

This study discusses the underlying concepts and indicators proposed to measure systemic importance. It argues that system-wide risk cannot be easily allocated to individual institutions, as systemic interdependencies are an integral part of a differentiated financial system. In particular, non-bank financials should not be excluded as potential SIFI candidates ex ante. Banks, insurers, investment funds and other non-bank financials all contribute to the smooth functioning of the financial and wider economic system and should be benchmarked according to their potential impact upon failure.

The relevance of individual institutions is also a function of the prevailing economic and market environment. Once more, the current handling of the European debt crisis has demonstrated that rather small events of perceived local relevance can easily turn into a crisis on a global scale if second and third round effects are not properly taken into account. The fact that systemic risk does not evolve in a linear way makes it difficult to identify systemically important institutions ex ante.

The study also highlights the difference between the aim of identifying systemically important institutions and the benchmarking of those institutions for regulatory purposes. It argues that indicators used to benchmark financial institutions need to fulfil additional criteria, which are not yet fully reflected in the current regulatory proposals. Policy makers need to take into account the response of market participants. For instance, judging systemic relevance by global activity provides incentives for banks to reduce cross-border diversification of credit and funding risk, which does not necessarily lead to a more stable system. Especially in the European but also in the global context, globally active banks may be part of the solution rather than part of the problem.

Finally, this study argues that greater weight should be given to qualitative factors which determine the likelihood that an institution would be resolved or restructured in an orderly procedure if it were to fail. Doing so would be in line with the aim to reduce moral hazard and help make the system more stable. If resolvability of market participants were established as a central theme in SIFI designation, competitive and other distortions could be minimised.

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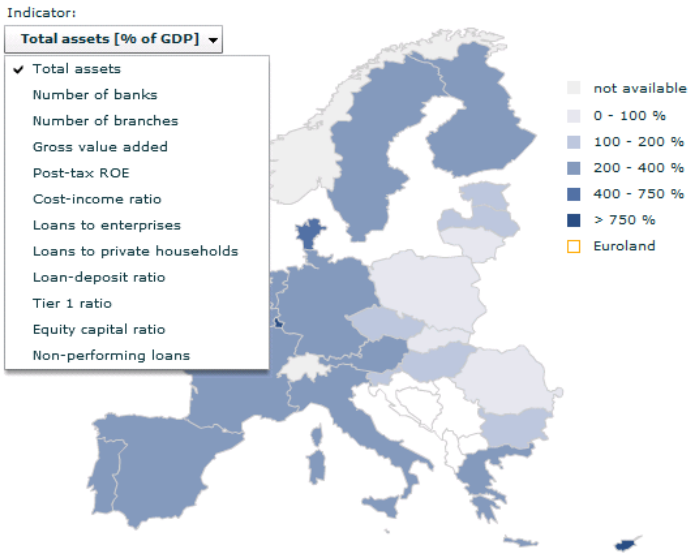

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