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Global systemically important banks: Assessment methodology and the additional loss absorbency requirement

Author: **Dusan Tanaskovic**

Supervisor: **PhDr Jakub Seidler Ph.D.**

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Declaration of Authorship

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Dusan Tanaskovic

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Abstract

This bachelor thesis deals with Global systematically important banks (G-SIBs) and how to identify them through various assessment. The crises in 2007 and failure of global financial institutions spread fast and sent shocks trough financial system which harmed the real economy worldwide. So it means that this is not a uniquely national authority's problem, therefore requiring a global minimum agreement. The aim of these additional policy measures is to deal with cross-border and "too big to fail" negative externalities together with moral hazard costs. Thesis explains the indicator-based measurement approach and bucketing approach introduced by BCBS. It illustrates how G-SIBs are allocated into different categories with different additional loss absorbency requirements and elaborates on how important is each particular indicator in calculating the final score.

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Author's e-mail	tane_92@live.com
Supervisor's e-mail	seidler@email.cz

Abstract

Tato bakalářská práce se zabývá globálními systémově významnými bankami (G-SIBs) a jak je identifikovat prostřednictvím různých metod. Krize v roce 2007 a selhání globálních finančních institucí přineslo do finančního sektoru silný šok, který se rychle šířil a zasáhl celosvětovou reálnou ekonomiku. To znamená, že regulace významných bank není pouze otázkou národní regulatorní autority, ale je potřeba najít širší dohodu napříč zeměmi. Cílem těchto dohod je zamezit přenosu rizik napříč zeměmi a zmírnit negativní externality plynoucí z problému „too-big-too-fail". Tato práce tak vysvětluje přístup identifikace systémových bank na základě indikátorového přístupu zavedeného BCBS. Práce objasňuje, jak jsou bankám přiřazovány vyšší kapitálové požadavky dle míry systémové významnosti a jak jsou jednotlivé indikátory použité při výpočtu důležité pro hodnotu finálního skóre systémové významnosti banky.

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Acronyms

BCBS	Basel Committee on Banking Supervision
G-SIB	Global Systematically Important Banks
G-SIFI	Global Systematically Important Financial Institutions
G-SIIF	Global Systematically Important Insurance
FSB	Financial Stability Board
MAG	Macroeconomic Assessment Group
CET1	Common Equity Tier 1
LEI	Long-term Economic Impact
HLA	Higher loss absorbency
TBTF	Too big to fail
RORWA	Rate of return on weighted assets
BIS	Bank for international settlements

Bachelor Thesis Proposal

Introduction
During the recent financial crisis that started in 2007, the failure or impairment of a number of large, global financial institutions sent shocks through the financial system which, in turn, harmed the real economy. Supervisors and other relevant authorities had limited options to prevent problems affecting individual firms from spreading and thereby undermining financial stability.

The Basel Committee on Banking Supervision, has, in response to the crisis, adopted a series of reforms to improve the resilience of banks and banking systems. They include raising the required quality and quantity of capital in the banking system, improving risk coverage, introducing a leverage ratio to serve as a backstop to the risk-based regime, introducing capital conservation and countercyclical buffers as well as a global standard for liquidity risk.

A number of the policy measures will have a particular impact on global systemically important banks (G-SIBs). The broad aim of the policies is to reduce the probability of failure of G-SIBs by increasing their going-concern loss absorbency; and to reduce the extent or impact of failure of G-SIBs, by improving global recovery and resolution frameworks.

The proposals set out in this thesis address the first objective of requiring additional going-concern loss absorbency for G-SIBs, thereby reducing the probability of failure. This is a critical and necessary measure.

Assessment methodology for systemic importance of G-SIBs outlines the methodology for determining a bank's relative global systemic importance. The Basel Committee has developed an assessment methodology for systemic importance of G-SIBs. The proposed methodology is based on an indicator-based measurement approach. The selected indicators are chosen to reflect the different aspects of what generates negative externalities and makes a bank critical for the stability of the financial system. The Basel Committee is of the view that global systemic importance should be measured in terms of the impact that a failure of a bank can have on the global financial system and wider economy. The selected indicators reflect the *Size* of banks, their *Interconnectedness*, the lack of readily available substitutes for the services they provide, their global (cross-jurisdictional) activity and their *Complexity*.
Size is a key measure of systemic importance. The larger the bank the more difficult it is for its activities to be quickly replaced by other banks and therefore a greater chance that its distress or failure would cause disruption to the financial markets in which it operates. The distress or failure of a large bank is also more likely to damage confidence in the financial system as a whole.
Interconnectedness implies that the financial distress at one institution can materially raise the likelihood of distress at other institutions given the network of contractual obligations in which these firms operate.
The systemic impact of a bank's distress or failure is expected to be negatively related to its degree of *Substitutability* as both a market participant and client service provider.

Given the focus on G-SIBs the objective of *Cross-jurisdictional activity* is to capture the global footprint of banks. The two indicators in this category measure the importance of the bank's activities outside its home (headquarter) jurisdiction relative to overall activity of other banks in the sample.
The systemic impact of a bank's distress or failure is expected to be positively related to its overall *Complexity* – the more complex a bank is, the greater are the costs and time needed to resolve the bank.

Bucketing approach
The Basel Committee proposes to group G-SIBs into different categories of systemic importance based on the score produced by the indicator-based measurement approach. G-SIBs will be allocated into several buckets based on their scores of systemic importance, with varying levels of additional loss absorbency requirements applied to the different buckets.

Supervisory judgment
Supervisory judgment can support the results derived from the indicator-based measurement approach of the assessment methodology. The Basel Committee has identified a number of ancillary indicators relating to specific aspects of the systemic importance of an institution that may not be captured by the indicator-based measurement approach alone. These indicators can be used to support the judgment overlay. Supervisory judgment can also be based on qualitative information. This is intended to capture information that cannot be easily quantified in the form of an indicator, for example, a major restructuring of a bank's operation. Qualitative judgments should also be thoroughly explained and supported by verifiable arguments. The supervisory judgmental overlay can be incorporated using the established sequential steps to the score produced by the indicator-based measurement approach.

Periodic review and refinement
The assessment methodology provides a framework for periodically reviewing the G-SIB status of a given institution. That is, banks have incentives to change their risk profile and business models in ways that reduce their systemic spillover effects. Banks can migrate in and out of G-SIB status over time and also between categories of relative systemic importance. For example, as emerging market countries continue to become more prominent in the global economy, the number of banks from these countries to be identified as G-SIBs might increase. There should be transparency to both the designated institutions and the markets about the criteria used to identify G-SIBs.

The magnitude of additional loss absorbency and its impact present the additional loss absorbency that G-SIBs will be required to meet.

Instruments to meet the additional loss absorbency requirement and interaction with other elements of the Basel III framework set out the capital instruments that can be used to meet the additional loss absorbency
Common Equity Tier 1 is a key element of the Basel III definition of capital. It is the highest quality component of a bank's capital as it is capable of fully absorbing losses whilst the bank remains a going concern. The Basel Committee considers the use of Common Equity Tier 1 to be the simplest and most effective way for G-SIBs to meet their additional loss absorbency requirement.
The Basel Committee is of the view that it is not appropriate for G-SIBs to be able to meet this requirement with instruments that only absorb losses at the point of non-

viability such as bail-in debt and capital instruments that absorb losses at the point of non-viability (low-trigger contingent capital)

Going-concern contingent capital (high-trigger contingent capital) is used here to refer to instruments that are designed to convert into common equity whilst the bank remains a going concern.

Conclusion on the use of going-concern contingent capital shows that based on the balance of pros and cons described above, the Basel Committee concluded that G-SIBs be required to meet their additional loss absorbency requirement with Common Equity Tier 1 only.

Phase-in arrangements include discussions introducing transitional arrangements to implement the new standards that help ensure that the banking sector can meet the higher capital standards through reasonable earnings retention and capital raising, while still supporting lending to the economy.

1 Introduction

During the recent financial crisis that started in 2007 real economy was harmed because of failure or impairment of a number of large, global financial institutions which sent shocks through the financial system. According to BCBS (2011) options to prevent the problems were limited by supervisors and other relevant authorities, so the individual firms were affected. Many countries decided to use public sector intervention to help large financial institutions during the crisis. As a result the world went through big financial and economic costs and associated increase in moral hazard. It was necessary to introduce some new additional measures to reduce the probability as well as impact from the failure of global systemically important financial institutions (G-SIFIs).

For example, in the UK the UK government (the taxpayers) needed to find £100bn to rescue their banks. More than £66bn for Royal Bank of Scotland (which is now 80% government owned) and Lloyds bank (now 25%owned by government). So as central banks and the taxpayers were the only funding avenues large enough to contain such unquantifiable risks. Or the other possibility was financial meltdown. After the crisis tens of billions of pounds worth of capital was directly injected into failing financial institutions to prevent the financial meltdown as they were considered as "too big to fail". So according to Kemal Ahmed (2014), all burden was put on public sector, and taxpayers becoming guarantor of the global financial system.

Like a response to the recent crisis, Basel Committee on Banking Supervision has adopted a series of reforms to improve the stability of financial system. They included raising of capital, improving risk coverage, introducing a leverage ratio, introducing capital conservation and countercyclical buffers as well as a global standard for liquidity risk. This paper is mainly based on capital requirements and which are applied to all internationally active banks. These measures will have a great impact on Global systematically important banks (G-SIB) because their business models are mainly based on trading and capital markets related activities. Not all negative externalities posed by G-SIBs could be solved by these policy measures. The main point for adopting additional policy measures is to prevent cross-border negative externalities between countries created by G-SIB, as current regulatory policies do not define it.

The main indicators that show how systematically important is the bank are *Size*, *Interconnectedness*, *Complexity*, lack of *Substitutability* and global scope. These institutions are seen to be so important that are perceived as not being allowed to fail. Like any other firm, these financial institutions are profit maximizing and will always try to maximize their private benefits, thus they will choose outcomes that, from a system-wide level, are sub-optimal because they do not take into account these externalities. Moreover, the moral hazard costs associated with banks expecting public support by governments may increase risk-taking and thus increase probability of

distress in the future. So the taxpayers will take the burden of any potential costs associated with moral hazard.

These requirements represent global minimum agreement, because as mentioned above failure of G-SIBs in one country will affect financial institutions in many countries and on global economy at large. So this cross-border problem needs to be regulated as it is not just problem for national authorities.

As BCBS said, the aim of these new polices is to:

- Reduce the probability of failure of G-SIBs by increasing their going-concern loss absorbency; and
- Reduce the extent or impact of failure of G-SIBs, by improving global recovery and resolution frameworks.

This paper sets out the proposal from the Basel Committee on the assessment methodology for global systemic importance and the magnitude of additional loss absorbency that G-SIBs should have. After, this assessment methodology is applied in the case of Deutsche bank. Evidence on indicators was found on Deutsche bank official web page, BCBS methodology was applied and the bank was allocated to the bucket. Because of some criticism on indicators from world banks, sensitivity analyses on weight of particular indicators were done. There are more types of analyses and all of them clearly show how each particular indicator is important in calculating the final score. Than this paper elaborates on Impact of new capital requirements, ways how to meet these requirements and the arrangements by which they will be phased in.

On FSB's initiative Basel Committee helps in efforts to reduce moral hazard of G-SIFI. The second main objective of FSB is to reduce the impact of failure of a G-SIB (not the probability of failure). Also the new requirements will reduce too-big-to-fail (TBTF) competitive advantages in funding markets. All these documents and polices have been made in close cooperation between Basel Committee and FSB.

As stated in the FSB's Recommendations, as experience is gained, the FSB will review how to extend the framework to cover a wider group of SIFIs, including financial market infrastructures, insurance companies and other non-bank financial institutions that are not part of a banking group structure.

The following section outlines the methodology for determining a bank's relative global systemic importance. Section 3 shows how the assessment works, applying it to Deutsche bank. In section 4 is discussing about some criticism coming from large banks and sensitivity analysis of particular indicators. Section 5 shows the Impact of requiring additional loss absorbency for G-SIB. Section 6 sets out the capital instruments that can be used to meet the additional loss absorbency.

2 Assessment methodology for systemic importance of G-SIBs

The FSB has recognized the need and argued on Basel Committee for developing a new assessment methodology based on both quantitative and qualitative indicators in order to assess systemic importance of G-SIFI. FSB also states that FSB and national authorities, together with BCBS, CGFS, CPSS, IOSCO and IAIS, drawing on relevant quantitative and qualitative indicators, will make a sample of institutions to which FSB G-SIFI recommendations will initially apply. We will explain the new assessment methodology introduced by Basel Committee in this section.

The new assessment methodology that Basel Committee has developed for systemic importance of G-SIB is known as "Indicator-based measurement approach". The new indicator-based measurement approach is much more effective than the already existing model-based measurement approach which rely on small set of indicators. The aim of selected indicators is to reflect the different aspects of indicators of negative externalities and makes bank critical for the stability of the financial system.

There is no single measurement approach which could perfectly measure systemic importance across all banks. These bank can have very different structures and engage in different activities and therefore the nature and the risk they pose to the international financial system will be different. Hence, the quantitative indicator based approach can be supplemented with quantitative information that is incorporated through a framework for supervisory judgment. The aim of supervisory judgment is to override the results obtained from indicator-based measurement approach just in rare cases.

2.1 Indicator Based measurement approach

The most important aspect on which the global systemic importance should be based on is the impact that a failure of a bank can have on the global financial system and wider economy.

There are five main indicators and these include: *Size* of banks, their *Interconnectedness*, and the lack of readily available substitutes for the services they provide, their global *Cross-jurisdictional activity* and their *Complexity*. The first three indicators (*Size*, *Interconnectedness* and *Substitutability*) have already existed and are in line with the IMF/BIS/FSB report submitted to the G20 Finance Ministers and Central Bank Governors in October 2009. But Basel Committee has included two more indicators. Since the aim of new assessment methodology is to identify global SIB that will need to meet additional loss absorbency requirements by new international standards, Basel Committee has included a category that measures the degree of global (cross-jurisdictional) activity. The second indicator Basel Committee introduced is *Complexity*, as financial institutions with greater *Complexity* are likely to be more difficult to resolve and therefore cause significantly greater disruption to the wider financial system and economic activity.

The new methodology is composed of five indicators which are: *Size*, *Cross-jurisdictional activity*, *Interconnectedness*, *Substitutability* and *Complexity*.

All of these five indicators are given equal weight of 20%. Now each category is composed of multiple sub-indicators. Where there are two sub-indicators they are given equal weight of 10% each. Where there are three sub-indicators they are given equal weight of 6.67%. The only exception is *Size* which has no sub-indicators and is weighed 20%.

Scores are calculated as follows. First calculate the scores for each particular indicator by dividing the individual bank amount (which banks are required to make publicly available) by the aggregate amount summed across all banks in the sample for a given indicator (denominator uploaded by Basel Committee). To express the indicator score in terms of basic points, the amount is then multiplied by 10000. For example, if the banks *Complexity* divided by total *Complexity* of all banks in the sample is 0.02, its score will be expressed as 200 basis points. Now each category score is for each bank is determined by taking the simple average of the sub-indicators in that particular category. And the final (overall score) for each bank is then calculated by taking a simple average of its five category scores. If the bank was the only bank in the sample, it would gain the maximum score of 1000 basis points (which is equal to 100%) according to BCBS (2011).

On the basis of the three years data, the committee has applied the methodology described above and analyzed the results. They found that from all five categories included in the assessment, only *Substitutability* has greater impact on the assessment of systemic importance than the Committee intended for the banks that are dominant in the provision of payment, underwriting and asset custody service. Therefore the BCBS (2013) has decided to apply a cap to the *Substitutability* category score. So cap will be fixed and disclosed during 2013, together with cut-off score and threshold for buckets.

Table 1: Indicator-based measurement approach

Category (and weighting)	**Individual Indicator**	**Indicator Weighting**
Cross-jurisdictional activity (20%)	Cross-jurisdictional claims	10%
	Cross-jurisdictional liabilities	10%
Size (20%)	Total exposures as defined for use in the Basel III leverage ratio	20%
Interconnectedness (20%)	Intra-financial system assets	6.67%
	Intra-financial system liabilities	6.67%
	Wholesale funding ratio	6.67%
Substitutability (20%)	Assets under custody	6.67%

	Payments cleared and settled through payment systems	6.67%
	Values of underwritten transactions in debt and equity markets	6.67%
Complexity (20%)	OTC derivatives notional value	6.67%
	Level 3 assets	6.67%
	Trading book value and Available for Sale value	6.67%

Source: BCBS (2013)

2.1.1 Indicators

This part will explain these five indicators proposed by BCBS (2013) in more details.

2.1.1.1 *Size*

The larger share of global activity the bank has, than the failure or distress of that bank will have bigger impact on global economy or financial markets. The chance of distress or failure of a bank would cause disruption to the financial market in which it operates is greater if the banks is that big in *Size* that its activities cannot be replaced quickly by other banks. Also in case of distress or failure of G-SIB would make a damage in confidence of a financial system as a whole. Therefore, *Size* is one of the most important measures of systemic importance.

How to calculate *Size* is explained in in paragraphs 157 to 164 of the Basel III (2011) rules text and it is measured using the same definition for total exposures (the exposure measure used for the leverage ratio). To calculate the score for each bank, divide amount of total exposures by the sum total of exposures of all banks in the sample.

2.1.1.2 *Interconnectedness*

Failure or financial distress at one bank can influence the distress at other banks given the network of contractual obligations in which these financial institutions operate. A bank's systemic impact is likely to be positively related to its *Interconnectedness* vis-à-vis other financial institutions, BCBS (2011). There are three parts of this indicator, each having the equal weight of 6.67%. And these are: Intra-financial system assets, Intra-financial system liabilities, and Wholesale funding ratio.

a) Intra-financial system assets

To calculate the Intra-financial assets, add the following:

- lending to financial institutions (including undrawn committed lines);

- holdings of securities issued by other financial institutions;
- net mark to market reverse repurchase agreements;
- net mark to market securities lending to financial institutions; and
- Net mark to market OTC derivatives with financial institutions.

b) Intra-financial system liabilities

To calculate the Intra-financial liabilities, add the following:

- deposits by financial institutions (including undrawn committed lines);
- securities issued by the bank that are owned by other financial institutions;
- net mark to market repurchase agreements;
- net mark to market securities borrowing from financial institutions; and
- Net mark to market OTC derivatives with financial institutions.

For these two indicator in this category „*Interconnectedness*“ can be calculated by dividing the Intra-financial system assets or Intra-financial system liabilities with the sum of the total Intra-financial system assets or Intra-financial system liabilities of all banks in the sample.

c) Wholesale funding ratio

This indicator should show the banks *Interconnectedness* with other financial institutions by considering the degree to which a bank is funding itself from other financial institutions via the wholesale funding market. We have experienced in last 2008 crisis that it has spread quickly and widely to other institutions and markets because market run on an institution whose illiquid assets were financed by short-term liquid liabilities (i.e. an institution with high wholesale funding ratio). Thus the wholesale funding ratio thus must be an important indicator in helping identify the systemic importance of a financial institution.

The wholesale funding ratio can be calculated by dividing (total liabilities less retail funding) by total liabilities. We define retail funding as the „sum of retail deposits (including certificates of deposit) and debt securities issued that are held by retail customers“.

2.1.1.3 *Substitutability*

The degree of *Substitutability* is negatively related to systemic impact of a bank's distress or failure for both, a client service provider or market participant, BCBS (2011). For example, the market and infrastructure liquidity are facing reduction in flow of market and service gaps in case of disruption or failure of a bank. The greater the role of a bank in a particular business line, or as a service provider in underlying market infrastructure, payment systems, and the impact of bank failure on market will be greater.

Another cost that arises from banks disruption or failure is that a customer needs to seek now for another service provider, and the cost is greater when market share of provider is greater.

There are three parts of this indicator, each having the equal weight of 6.67%. And these are: Assets under custody, Payments cleared and settled through payment systems, Values of underwritten transactions in debt and equity markets.

a) Assets under custody

Global economy could be seriously harmed as well as financial markets in case of failure of a large custodian bank, which holds assets on behalf of customers including other financial firms.

A failure of a large custodian bank, holding assets on behalf of customers including other financial firms, could disrupt the operation of financial markets with potentially significant negative consequences for the global economy. Large counterparty exposures to custodian banks could also have firms which are not operating on financial markets, by BCBC (2011)

To calculate this indicator, divide the value of assets that a bank holds as a custodian by the sum total of the figures reported by the banks in the sample.

b) Payments cleared and settled through payment systems

Large number of institutions and customers (for example retail customers) have their bank doing large number of activities on their behalf, like large volume of payment activities. If it comes to disruption or even failure of a bank, it may affect the liquidity because these other institutions and customers may be unable to process payments, immediately. So banks are important providers of liquidity and also other banks may rely on that particular bank to recycle liquidity intraday. In case of bank failure, where bank is a net receiver of liquidity, this liquidity would be trapped and inaccessible to other system members. In this case, other banks would need to provide more liquidity than usual to process their payments, and this means that their costs have increased and high probability of delay according to BCBS (2011).

This indicator is being calculated by dividing the value of a bank's payments sent through all of the main payments systems of which it is a member by the sum total of the figures reported by the banks in the sample.

c) Values of underwritten transactions in debt and equity markets

BCBS (2011) argues that it would have large negative consequences for the economy in case that a bank with a large share of underwriting of debt and equity instruments in the global market fails, because it would significantly impede new securities issuance.

To calculate this indicator divide the annual value of debt and equity instruments underwritten by the bank by the sum total of the figures reported by the banks in the sample.

2.1.1.4 *Cross-jurisdictional activity*

The indicators in this category should measure the importance of the bank's activities outside its home (headquarter) jurisdiction relative to overall activity of other banks in the sample according to BCBS (2011). So it could be said that the aim of *Cross-jurisdictional activity* is to capture the global footprint of banks. The point is that in case of banks distress or failure, the international impact should vary in line with its share of cross-jurisdictional assets and liabilities. So the greater is the spread of the bank, it is more difficult to coordinate its resolution and more widespread the spillover effect from its failure. The two individual indicators within this Category are: a) Cross-jurisdictional claim and b) Cross-jurisdictional liabilities.

a) Cross-jurisdictional claim

To calculate the score of cross-jurisdictional claims, divide the individual bank amount of claims by the sum of claims of all institutions that are included in the sample.
Data used for this indicator are same as data that internationally active banks report to the central banks in their home jurisdiction for the compilation of the Bank for International Settlements (BIS), which is consolidated with international banking statistics. These figures should be reported quarterly by banks. Total foreign claims in terminology of BIS is represented by sum of two components:

- International claims, which can be:
    - Cross border claims (from an office in one country on a borrower in another country)
    - Local claims in foreign currency (from the local office of the bank on the borrower in that location in a currency other than the one of the location)
- Local claims in local currency (same as the previous local claims, just the difference is that the currency is of that location)

The further details for central banks reports can be found in Statistical annex of the BIS Quarterly Review, International Banking Markets (Table 9C, column S).
Claims include: deposits and balances placed with other banks, loans and advances to banks and non-banks, and holdings of securities and participations. These data exclude all intra-office claims (since they refer to consolidated activities).

b) Cross-jurisdictional liabilities

To calculate the score for cross-jurisdictional liabilities, used formula is: Total foreign liabilities (aggregated for all local offices) – Liabilities vis-à-vis related offices (aggregated for all local offices) + Local liabilities in local currency. It is represented as a fraction of the sum total of the amounts reported by all banks in the sample.

Internationally active banks need to report the data to the BIS consolidated international banking statistics, so that this indicator can be calculated. This specific indicator uses the combination of some figures reported as part of the locational banking statistics (by nationality) with figures that are reported for the consolidated banking statistics. Like cross-jurisdictional assets, "cross-jurisdictional liabilities should cover the liabilities of all offices of the same banking organization (headquarters as well as branches and subsidiaries in different jurisdictions) to entities outside the home market", according to BCBS (2011).

Individual banking groups need to sum up figures that are reported to different central banks for the locational BIS statistics and combine them with the information on intra-office (i.e. between offices that belong to the same banking group) liabilities. This is done because BIS consolidated banking statistics dataset does not include a concept similar to foreign claims for liabilities.

More in detail, across all jurisdictions in which banks are present, they need to collect data and sum the information and report to relevant central bank:

- Total foreign liabilities which are defined in the locational banking statistics dataset (see reference above) and reported in Column "Total positions - liabilities" in Table 8A of the Statistical Annex of the BIS Quarterly review (International Banking Market).

- Liabilities vis-à-vis related offices which are defined in column "Total positions – of which vis-à-vis related offices" in Table 8A of the Statistical Annex of the BIS Quarterly review (International Banking Market).

On top of that, banks are required to report data for "Local liabilities in local currency" that they report to the central bank in their home jurisdiction for inclusion in the BIS consolidated banking statistics (column M of table 9A of the Statistical Annex of the BIS Quarterly Review (International Banking Market)).

2.1.1.5 *Complexity*

The degree of overall *Complexity*, and that is business, structural and operational *Complexity* is positively related to systemic impact of a bank's distress or failure. It requires more time and higher costs to resolve the bank if the bank is more complex.

There are three parts of this indicator, each having the equal weight of 6.67%. And these are: OTC derivatives notional value, Level 3 assets, and Trading book value and Available for Sale value.

a) OTC derivatives notional value

Gross notional or nominal value of all deals that have been concluded and not yet settled at the reporting date represent notional or nominal amounts by BCBS (2011). To measure market *Size* and a reference from which contractual payments are determined in derivatives markets, we use notional or nominal amounts that are outstanding.

The point why the OTC derivatives are so important is that they are not cleared through a central counterparty. Bank's activities get more complex with the increase of non-centrally cleared OTC derivatives a bank enters into. This was one of the important parts of resolution about Lehman Brothers fail.

For all types of risk categories and instruments like sum of foreign exchange, interest rate, equity, commodities, CDS and unallocated, banks need to report the figure for total notional amount.

To calculate the indicator for each bank, divide notional amount outstanding for the bank by the sum total of the amounts reported by all banks in the sample.

b) Level 3 assets

If we use observable measures such as market prices or models, we cannot determine fair value of these assets according to BCBS (2011). Only in case when estimates or risk-adjusted value ranges are used, Level 3 assets can be calculated because they are illiquid. The aim of this classification system is to make balance sheet assets of corporations more clear. In case of distress or failure of institution, banks with a high proportion of Level 3 assets on their balance sheets would face severe problems in market valuation, and further affecting market confidence.

To calculate the indicator for each bank divide reported value of Level 3 assets and by the total of the amounts reported by the banks in the sample.

c) Trading book value and Available for Sale value

Fear of creating spillovers through mark to market loss and subsequent fire sale of these securities would happen if holding financial securities in the trading book and available for sale securities (BCBS, 2011). This would happen in case an institution experiences severe stress. This would have like a consequence driving down the prices of these securities, forcing other financial institutions to write-down their holdings of the same securities.

To calculate the indicator for each bank divide the total value of the bank's holding of securities in the trading book and available for sale category by the sum total of the figures reported by the banks in the sample.

2.2 Sample of Banks

Like a representative for the global banking sector, Basel Committee uses for the indicator-based measurement approach a large sample of banks. Basel Committee is than using data supplied by this sample of banks to calculate banks' scores. Criteria by BCBS (2013) that banks need to fulfilling in order to be included in the sample are:

- The 75 largest global banks identified by Committee identifies as the 75, based on the financial yearend Basel III leverage ratio exposure measure.
- In case that a bank was selected as G-SIB in previous year (unless supervisors agree that there is compelling reason to exclude them).
- Or if the Bank was added to the sample by national supervisors using supervisory judgment (subject to certain criteria).

Banks that have fulfilled any of these requirements above will be required to submit the full set of data used in the assessment methodology to their supervisors according to BCBS (2013).

2.3 Bucketing

Now that the overall score is calculated for each bank in the indicator-measurement approach we can proceed to the bucketing approach. Banks which achieved a score by indicator measurement approach that exceeding the cutoff level will be classified by BCBS (2013) as G-SIB. Than based on their score Basel Committee allocates banks indo different groups of systemic importance depending on bucket threshold level. Each group has different additional loss absorbency requirements, where groups with higher score have higher absorbency requirements.

From the sample of 73 banks was chosen in January 2011 by the Basel Committee, BCBS (2011), based on collected data for end-2009 which included the indicators of the proposed indicator-based measurement approach. Based on *Size* and supervisory judgement this sample of 73 world's largest banks was chosen. Than the trial score for these banks in sample was produced using the methodology described above by BCBS (2011).

When Basel Committee applied the methodology, they have chosen that there will be 27 G-SIB, and one more bank was added later by the supervisory judgement, so the final number was 28 banks, BCBS (2013). The first cut-off point was agreed to be between 27th and 28th bank, based on trial scores produced by methodology. This number of banks will be evolving over time, because banks change their behavior in response to the incentives of the G-SIB framework. Bank can become more or less systematically important and move from bucket to another.

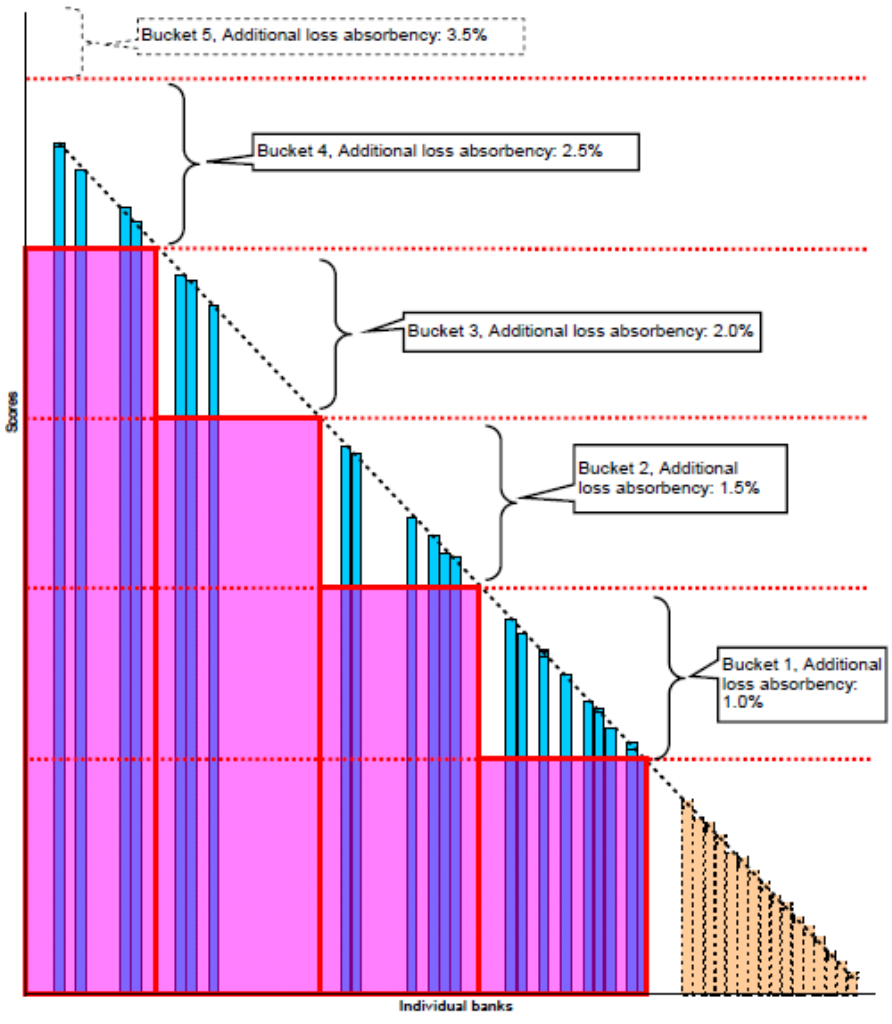
While deciding the threshold for the buckets, BCBS (2011) took into consideration several factors. First one is that buckets should be equal *Size*d in terms of scores. The aim of this is to ensure the assessments of systematic importance are comparable across

time and help to give banks incentives to reduce their systematic importance. In addition, thresholds for the buckets should broadly correspond to the gaps identified by a cluster analysis of the scores produced by methodology. Second is the significance of cliff effects in the scoring.

In case that a bank exceeds the already set threshold of the highest (fourth) bucket, the new empty bucket will be added on the top of the highest populated bucket. New bucket will be equal in *Size* in terms of scores to each initial four populated buckets and will require higher loss absorbency requirements. The aim of this new bucket is to provide incentives for banks to avoid becoming even more systematically important. If the empty bucket becomes populated in the future, than new empty bucket will be added with even higher additional loss absorbency requirements than the previous one.

Based on trial scores of the banks, the BCBS (2011) proposes that four equal *Size*d buckets between the cutoff score and the maximum score should be set. We can see that in the following graph. Four buckets equally distributed and the fifth empty bucked added on the top.

Figure 1: Distribution of the trial scores of G-SIBs and their allocation to buckets



Source: BCBS (2013)

2.4 Supervisory judgment

2.4.1 Criteria for Judgment

After the indicator-based measurement approach of the assessment methodology has been done and results have been obtained, the supervisory judgement can support the results. There are four basic principles for supervisory judgement, BCBS (2011):

- The main point of supervisory judgment should be to override the indicator-based measurement approach in exceptional cases, so the bar should be high.
- The *impact* of given bank's distress/failure should be in focus of supervisory judgment and not the probability of distress/failure (i.e. the riskiness) of the bank.
- The quality of G-SIB identification process should not be a subject to supervisory judgement; and
- Quantitative as well as qualitative information be well-documented and verifiable in order to run the judgmental overlay.

2.4.2 Ancillary indicators

Some specific aspects of the systemic importance of a bank cannot be evaluated by indicator-based measurement approach alone. So because of this reason BCBS (2011) has developed number of ancillary indicators. To support the judgement overlay there ancillary indicators should be used.

Table 2: List of standardized ancillary indicators

Category	Individual Indicator
Cross-jurisdictional activity	Non-domestic revenue as a proportion of total revenue
	Cross-jurisdictional claims and liabilities as a proportion of total assets and liabilities
Size	Gross or net revenue
	Equity market capitalization
Substitutability	Degree of market participation: 1. Gross mark to market value of repo, reverse repo and securities lending transactions 2. Gross mark to market OTC derivatives transactions
Complexity	Number of jurisdictions

Source: BCBS (2011)

2.4.3 Qualitative judgment

Qualitative information is one of main aspects of Supervisory judgement, because it should capture information that cannot be easily quantified trough indicator-based measurement approach alone, BCBS (2011). One example is when bank is restructuring major operations. Qualitative judgement also needs to be explained and supported by verifiable arguments.

2.4.4 Process for incorporating the supervisory judgment

The following sequential steps are used for the process of incorporating the supervisory judgement:

(i) First collect the data from all banks in the sample and then let the supervisors give their comments;

(ii) Second, process for applying for indicator-based measurement approach and then bucketing of banks;

(iii) Third, adjustment to the score can be made for a particular bank on the basis of an agreed process by relevant authorities;

(iv) Than the recommendations for the FSB has been made by Basel Committee; and

(v) Finally, the final decision is made by agreement within these three authorities : FSB, national authorities and Basel Committee

While running the supervisory judgement it needs to be ensured that it will be done in effective and transparent way. Results of supervisory judgement should only be accepted in case that in changes the outcome of a specific bank, for example puts it into a different bucket. Also results that show that a bank should be put in a lower bucket with lower additional loss absorbency requirement would require a stronger justification, than those banks that should be put into a higher bucket with higher additional loss absorbency requirement. So the lower ones will be subject to higher standards of proof and documentation. This rationale for this asymmetric treatment is set out by BCBS (2011).

2.5 Periodic review and refinement

Status of each G-SIB institution should be periodically reviewed as provided by assessment methodology BCBS (2011). Each bank has incentives to reduce their systemic spillover effects by changing their risk profile and business models. There is no point to make a fixed list of G-SIBs which cannot be changed. Over time banks can migrate in and out of G-SIB status and also between different buckets with different requirements. Banks should be motivated and have incentives to reduce their systemic

importance is that they have lower capital requirements. Also if they become more systematically important, they need to be punished by putting them into a higher bucket with higher capital requirements. For example, the number of G-SIB banks may increase in countries identified as emerging markets because they become more prominent in the global economy. This process of identifying G-SIB should be transparent and therefore the steps that can be taken to reduce the impact on the system. This will bring global financial stability to a higher level trough market discipline.

2.6 Disclosure requirements

All banks that have a leverage ratio exposure measure exceeding EUR 200 billion at the financial year-ends, which is each year on 31st of December starting on 2013 and each subsequent year after, should be required to make 12 indicators used in the assessment methodology are made publicly available according to BCBS (2013). National authorities need to ensure this. The aim of setting the EUR 200 billion threshold was to capture the 75 largest banks in the world, so that they need to publicly disclose their requirements. These banks are automatically included in the sample for calculating overall banks scores. Other two possibilities to be added to this sample is that bank was recognized as G-SIB in a previous year or has been added to the sample by supervisory judgement.

3 Applied Methodology: Results

This section will go through assessment methodology for systematic importance of G-SIB described in previous chapters and apply them to the chosen sample of banks, so that we can see how the methodology works and also check if the preliminary results are correct.

Disclosure requirement proposed by BCBS (2013) suggest that for each subsequent financial year, all banks with leverage ratio exposure measure exceeding EUR 200 billion (using the exchange rate applicable at the financial-year end) should be required by national authorities to ensure that the 12 indicators used in the assessment methodology are made publicly available. The objective of this EUR 200 threshold was to ensure that 75 world largest banks are included in this the sample, which makes them subject to the public disclosure requirements. If banks are below this threshold, they can still be added to this sample by supervisory judgment or if the bank has been classified as G-SIB in previous year it will than need to make 12 indicators publicly available.

The global minimum is publication of 12 indicators, but national authorities can require banks to disclosure full breakdown of the indicators. Disclosed indicators should relate to banks financial year-ends. So to give BCBS enough time to make their calculations, banks are required to disclosure 12 indicators no later than four months after the financial year end, in any case no later than end- July.

Taking into consideration the time of writing this thesis, we are limited to the banks which have uploaded their 12 indicators yet. These indicators can be found in banks financial statements or at minimum, statement must provide direct link to the completed disclosures on their websites or on publicly available regulatory report.

These indicators which have been uploaded by the banks will be taken to run the indicator-based methodology approach and then do the bucketing approach. Than check if the bank should be classified as G-SIB or it will remain under the cutoff point. If the bank exceeds the cutoff point, it should be considered as G-SIB and should be allocated to buckets with adequate minimum additional loss absorbency requirements

3.1 Evidence

Methodology will be applied to Deutsche bank.

So here are the 12 indicators based on 2014 report on the financial year ending **on 31st December 2013** for each bank has uploaded on their websites:

Table 3: Deutsche bank indicator scores

Deutsche bank (EUR Mn)

Category	Indicator	Bank score
Size	Total exposures	1,747,748
Interconnectedness	Intra-financial system assets	303,108
	Intra-financial system liabilities	249,662
	Securities outstanding	198,552
Substitutability/financial institution infrastructure	Payment activity	164,892,430
	Assets under custody	3,114,660
	Underwritten transactions in debt and equity markets	319,512
Complexity	Notional amount of OTC derivatives	49,579,006
	Trading and AFS securities	130,132
	Level 3 assets	27,384
Cross-jurisdictional activity	Cross-jurisdictional claims	762,580
	Cross-jurisdictional liabilities	674,205

Source: Deutsche bank (2014)

Before starting the calculation, ensure that indicators have been converted into EUR. Using the official BCBS exchange rate, without rounding the numbers. Attention needs to be paid to that the correct currency conversion representing the specific fiscal year-end is chosen. In our case all numbers are in million EUR, so no conversion is needed.

3.2 Denominators

The table represent the "denominators" for each particular indicator which were calculated as aggregate amount for the particular indicator summed across all banks in the sample (and that is 75 largest global banks).

Table 4: Denominators* (in EUR)

Category	**Individual indicator**	**Denominators (end-2012 exercise)**	**Denominators (end-2013 exercise)**
Size	Total exposures as defined for use in the Basel III leverage ratio	69,158,725,307,224	66,313,252,232,943
Cross-jurisdictional activity	Cross-jurisdictional claims	16,498,115,035,100	15,800,934,260,979
	Cross-jurisdictional liabilities	16,093,124,462,531	14,093,660,568,019

Interconnectedness	Intra-financial system assets	8,918,054,432,043	7,717,965,931,836
	Intra-financial system liabilities	8,162,462,456,211	7,830,851,966,370
	Total marketable securities	11,221,392,343,225	10,836,237,185,460
Substitutability/financial institution infrastructure	Assets under custody	98,100,909,211,865	100,011,715,645,358
	Payments	1,664,159,892,820,090	1,850,754,573,909,200
	Values of underwritten transactions in debt and equity markets	4,547,081,105,541	4,487,480,557,423
Complexity	OTC derivatives notional value	651,933,169,050,368	639,987,527,203,752
	Level 3 assets	643,920,283,937	595,404,598,635
	Held for trading and available for sale assets minus HQLA	5,603,879,593,861	3,310,507,132,019

Source: BIS (2014)

These Denominators are expressed in EUR, but we will convert it to million EUR.

3.3 Indicator scores

In order to calculate the score for a specific indicator, divide the "Bank value" with the "Sample total" for that indicator. Than to multiply the result by 10,000 to obtain the result in basic points (bps). The formula below is used for calculation:

$$\frac{\text{Bank indicator (euros)}}{\text{Sample total (euros)}} \times 10000, = \text{Indicator score (bps)}$$

Table 5: Indicator score calculations (EUR millions)

Category	Indicator	Bank value		Sample total		Indicator score (bps)
Size	Total exposures	1,747,748	÷	66,313,252.232943*	10,000 =	263.559
Interconnectedness	Intra-financial system assets	303,108	÷	7,717,965.931836*	10,000 =	392.730
	Intra-financial system liabilities	249,662	÷	7,830,851.966370 *	10,000 =	318.818
	Securities outstanding	198,552	÷	10,836,237.185460 *	10,000 =	183.229
Substitutability/financial institution infrastructure	Payment activity	164,892,430	÷	1,850,754,573.909200 *	10,000 =	890.947
	Assets under custody	3,114,660	÷	100,011,715.645358 *	10,000 =	311.429

	Underwritten transactions in debt and equity markets	319,512	÷	4,487,480.557423 *	10,000	=	712.007
Complexity	Notional amount of OTC derivatives	49,579,006	÷	639,987,527.203752 *	10,000	=	774.687
	Trading and AFS securities	130,132	÷	3,310,507.132019 *	10,000	=	393.087
	Level 3 assets	27,384	÷	595,404.598635 *	10,000	=	459.922
Cross-jurisdictional activity	Cross-jurisdictional claims	762,580	÷	15,800,934.260979 *	10,000	=	482.617
	Cross-jurisdictional liabilities	674,205	÷	14,093,660.568019 *	10,000	=	478.374

Source: author's computations

3.4 Category scores

To calculate the category score, first average the scores within each category. For example, *Size* indicator has only one score within category and thus there is no need to average it. On the other hand, the *Complexity* score needs to be averaged over three scores: Notional amount of OTC derivatives, Trading and AFS securities, and Level 3 assets.

Important note, *Substitutability* score can never exceed the 500 bps score, because it is always subject to 500 bps cap.

Table 6: Category score calculations (bps)

Category	Average indicator score =	Raw score	Category cap	Final category score
Size	263 ÷ 1 =	263	-	263
Interconnectedness	(392 + 318 + 183) ÷ 3 =	297.6̄	-	297.6̄
Substitutability	(890 + 311 + 712) ÷ 3 =	637.6̄	500	500
Complexity	(774 + 393 + 459) ÷ 3 =	542	-	542
Cross-jurisdictional activity	(482 + 478) ÷ 2 =	480	-	480

Source: Author's computations

3.5 The final score

To calculate the Final score, the average of five category scores needs to be found, and then rounding to the nearest whole basis point. This means that each of five categories has the same weight in calculating the final score.
(263 + 297.6 + 500 + 542 + 480) ÷ 5 = 416.52 bps.

3.6 Supervisory judgment

At this stage of assessment, the obtained score can be adjusted based on supervisory judgment. It is allowed according to paragraph 30 of BCBS's G-SIB standards. The reason to run the supervisory judgment are usually qualitative or quantitative factors

that cannot be examined by 12 indicators. The final decision is on FSB supervisory authorities and Basel Committee.

3.7 HLA requirements (Bucketing)

At this part banks are allocated to a specific bucket if the score exceeds the cut-off score. The scores obtained in BPS units should be converted into HLA units (higher loss absorbency). This is done with the table below which shows the cut-off score for G-SIB which is currently at 130bps and the range of each other bucket is 100 bps, which can be seen from the table. For example, bank which achieved a score of 255 should be located into bucket 2 and thus increase the Common Equity Tier 1 capital (CET1) by 1.5% HLA. Buckets will change over time, but the last bucket 5 is set to be empty, and if it becomes populated the new bucket will be added on the top, thus the banks will not have incentives to become even more systematically important. Each new bucket will keep the constant increase of 1.0% in CET1 (the next one bucket 6 will be +4.5%).

In our case, the Deutsche bank has been allocated to the third bucket with the increase of +2.0% CET1.

Table 7: End-2013 G-SIB buckets

Bucket	Score range	HLA requirement
5	530–629	+3.5% CET1
4	430–529	+2.5% CET1
3	330–429	+2.0% CET1
2	230–329	+1.5% CET1
1	130–229	+1.0% CET1

Source: BCBS (2014)

3.8 Phase-in period

The G-SIB surcharge (together with other elements like countercyclical buffer) will expand the 2.5% capital conversion buffer. The table below shows the general formula for calculating the three year phase in period which starts on 1st January 2016 and will last till 2019, when the total buffer is going to be completely phased in.

Table 8: Phase-in period

Year	Applicable capital conservation buffer[1]
2016	25% * [2.5% buffer + G-SIB HLA requirement (based on end-2013 data)]
2017	50% * [2.5% buffer + G-SIB HLA requirement (based on end-2014 data)]
2018	75% * [2.5% buffer + G-SIB HLA requirement (based on end-2015 data)]
2019	100% * [2.5% buffer + G-SIB HLA requirement (based on end-2016 data)]

Source: BCBS (2014)

During this three year period the level of capital conservation buffer will vary depending on the year. In our case Deutsche bank is in 3rd bucket and subject to 2.0% increase in HLA and only to minimum 2.5%. The table below shows how to calculate the each year phase-in period for Deutsche bank.

Table 9: Buffers associated with a 2.0% HLA requirement

Year	Applicable capital conservation buffer
2016	25% * [2.5% + 2.0%] = 0.625% + 0.5% = 1.1250%
2017	50% * [2.5% + 2.0%] = 1.25% + 1.0% = 2.25%
2018	75% * [2.5% + 2.0%] = 1.875% + 1.5% = 3.375%
2019	100% * [2.5% + 2.0%] = 2.5% + 2.0% = 4.5%

Source: BCBS (2014)

G-SIB requirements are changing over time, buffers must be calculated for each respective year. For example, the applicable capital conservation buffer for a bank subject to a 2.0% HLA requirement in 2017 is 2.25%. (See the table above). If should a Deutsche bank be subject to a higher 2.5 HLA requirement for the following year, the applicable conservation buffer for 2018 would be:

75% * [2.5% + 2.5%] = 1.875% + 1.875% = 3.75%.

3.9 G-SIB

FSB (Financial Stability Board) has published integrated policy measures in November 2011 to address the moral hazard and systemic risk associated with Global systematically important financial institutions G-SIFI.

The newest version of G-SIBs as of November 2014 allocated to buckets corresponding to required level of additional loss absorbency. If the bank is allocated to one bucket doesn't mean that it cannot change the bucket for the next fiscal year. In our case, the Deutsche bank has changed the bucket in 2013 moving from fourth bucket (2.5%) to third bucket (2.0%) and therefore reducing the level of systemic importance and becoming subject to lower increase in Common Equity Tier 1 capital (CET1).

Table 10: G-SIB classified to buckets

Bucket[7]	**G-SIBs in alphabetical order within each bucket**
5 **(3.5%)**	(Empty)
4 **(2.5%)**	HSBC JP Morgan Chase
3 **(2.0%)**	Barclays BNP Paribas Citigroup Deutsche Bank
2 **(1.5%)**	Bank of America Credit Suisse Goldman Sachs Mitsubishi UFJ FG Morgan Stanley Royal Bank of Scotland
1 **(1.0%)**	Agricultural Bank of China Bank of China Bank of New York Mellon BBVA Groupe BPCE Group Crédit Agricole Industrial and Commercial Bank of China Limited ING Bank Mizuho FG Nordea Santander Société Générale Standard Chartered State Street Sumitomo Mitsui FG UBS Unicredit Group Wells Fargo

Source: FSB (2014)

4 Criticism

4.1 Criticism on indicators

Many banks worldwide have criticized Basel Committee on Banking Supervision (BCBS, 2011) on their new methodology for determining globally systematically important banks GSIB for its lack of transparency and focus on sheer *Size*. *Size* is the only indicator that is weighed 20% of total result, without any sub group, thus making it the most influential indicator. Many banks had to say something about this indicator. BNP Paribas (2011) said that the criterion of *Size* is probably the most problematic of all indicators used for GSIB calculation. Douglas Flint (2011) from the HSBC argued that there are many of other measures heavily in correlation to the total *Size* of an institution. BNP Paribas (2011) argued that calculations used for the *Complexity* and *Substitutability* indicators are similar, and thus can double counting. According to the bank, this may lead to overweight impact of *Size* in the final score, well beyond the 20% that is officially stated.

4.2 Sensitivity analyses of weight of particular indicators

In this section we will evaluate how sensitive are final results on each particular indicator. We will apply assessment methodology for GSIB to Deutsche bank eliminating each indicator separately and see what will be the impact. What is final score going to be and weather will this have significant impact.

4.2.1 Approach 1: Reducing the weight of each particular indicator to 10%

In the first approach we will simply make each particular indicator equal to 10 %, spreading the rest over other four indicators and thus making them increase their weight to 22.5%. Then see what will be the impact on final score. So the total number of indicators remain the same, which is five.

Size

Firstly, start from the most criticized category and that is *Size*. Tested indicator (in our case *Size*) will have 10% and all other indicators 22.5%

Table 11: Final score; *Size* = 10%

Category	Indicators	score
Size = 10%	263 * 0.1 =	26.3
Interconnectedness = 22.5%	(392 + 318 + 183) * 0.225 =	62.91
Substitutability=22.5%	(890 + 311 + 712) * 0.225 =	112.5
Complexity=22.5%	(774 + 393 + 459) * 0.225 =	121.95
Cross-jurisdictional activity=22.5%	(482 + 478) * 0.225 =	108
Sum		431.66

Source: Author's computations

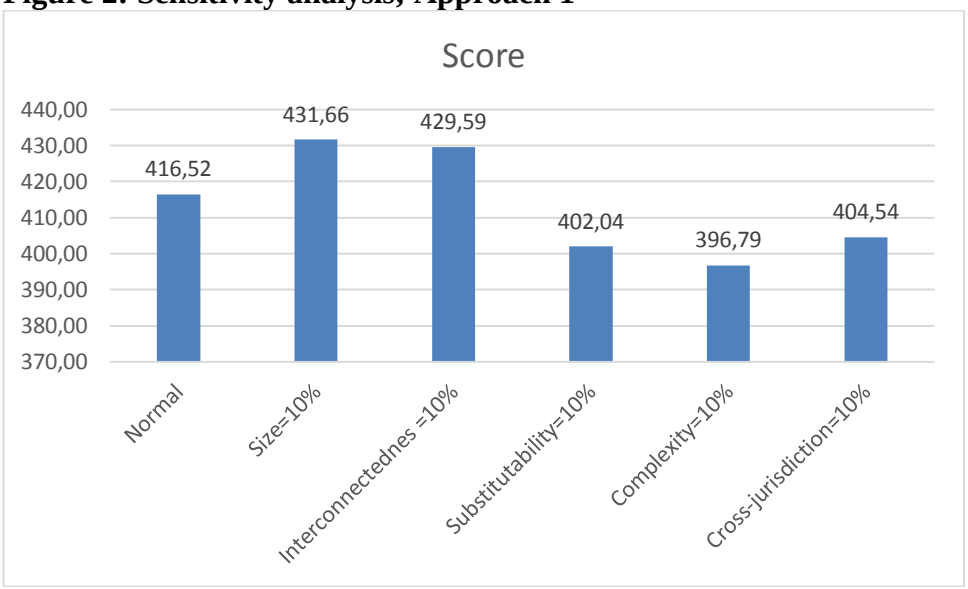
Using the same method, each time one indicator is going to weight 10% and others 22.5%. Other computations could be found in Appendix A.

The final score for each situation is as follows:

- *Size* = 10%, final score is 431.66
- *Interconnectedness* = 10%, final score is 429.585
- *Substitutability* = 10%, final score is 402.035
- *Complexity* = 10%, final score is 396.785
- *Cross-jurisdictional activity* = 10%, Final score is 404.535

Figure below describes all these results graphically.

Figure 2: Sensitivity analysis; Approach 1



Source: Author's computation

The figure above shows final results of each situation, when each particular indicator is weighted 10% and others 22.5%, compared to normal situation, when all indicators weigh 20%. If *Size* is weighted less 10%, it would increase the final score of Deutsche bank up to 431.66, which is the highest score among all tested indicators. According to table 7 which shows the bucket score range, now the Deutsche bank would move one bucket higher as the score is slightly above 430bps which was the upper limit of

third bucket. So the bank would be allocated to fourth bucket increasing its importance as well as capital requirements to 2.5% CET1. This is the highest bucket, as the fifth one is still empty. This outcome is because the importance of *Size* indicator has decreased, but that has increased the importance of all other indicators which resulted in higher final score. Second tested indicator was *Interconnectedness* equal to 10%. The final score is higher than the normal one and is 429.59bps, which is right on the border between third and fourth bucket, higher than 429, lower than 430. So according to BCBS (2013) proposed buckets, this score is not defined. Other three case for *Substitutability*, *Complexity* and *Cross-jurisdictional activity* are much lower, with *Complexity* being at minimum which is 396.79. In all three cases the Deutsche bank will remain in the same third bucket with same requirements of +2.0 CET1.

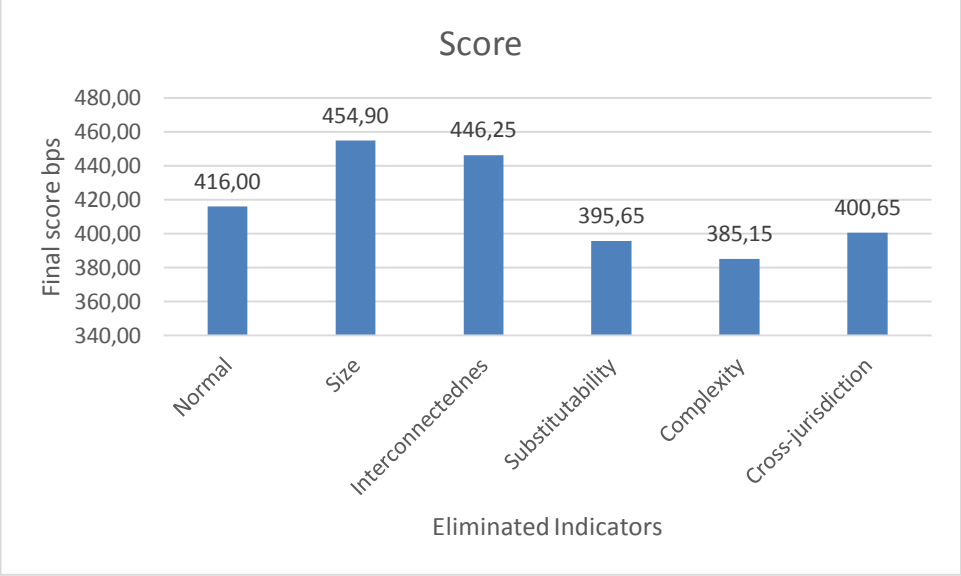
4.2.2 Approach 2: Eliminating each particular indicator

Second approach will eliminate each particular indicator, thus increasing the weight of other indicators to 25%. So the total number of indicators is now lower, and that is four. Category scores from table 6 will be used.

Final score for each eliminated indicator is as follows:

- *Size* eliminated: (297.6 + 500 + 542 + 480) ÷ 4 = 454.9 bps
- *Interconnectedness* eliminated: (263 + 500 + 542 + 480) ÷ 4 = 446.25 bps
- *Substitutability* eliminated: (263 + 297.6 + 542 + 480) ÷ 4 = 395.65 bps
- *Complexity* eliminated: (263 + 297.6+ 500 + 480) ÷ 4 = 385.15 bps
- *Cross-jurisdictional activity* eliminated: (263 + 297.6+ 500 + 542) ÷ 4 = 400.65 bps

Figure 3: Sensitivity analysis; Approach 2



Source: Author's computation

Second approach is similar to the previous one, but the results are more extreme. The figure above shows final results of each situation, when each particular indicator is eliminated and others 25%, compared to normal situation, when all indicators weigh 20%. The first case shows the final score when *Size* indicator is eliminated, making all other indicators weigh 25%. The result is very high because other indicators have

increased their importance. This final score is the highest among all three approaches and is equal to 454.90. According to table 7, this would move Deutsche bank to a higher bucket, fourth bucket, and increase the capital requirements to +2.5% CET1. Same will happen in the second situation where *Interconnectedness* is eliminated and the final score is 446.25. This would also move Deutsche bank to a higher bucket, fourth bucket, and increase the capital requirements to +2.5% CET1. Other three situations for *Substitutability*, *Complexity* and *Cross-jurisdictional activity* are much lower, with *Complexity* being at minimum which is 385.15. In all three cases the Deutsche bank will remain in the same third bucket with same requirements of +2.0 CET1.

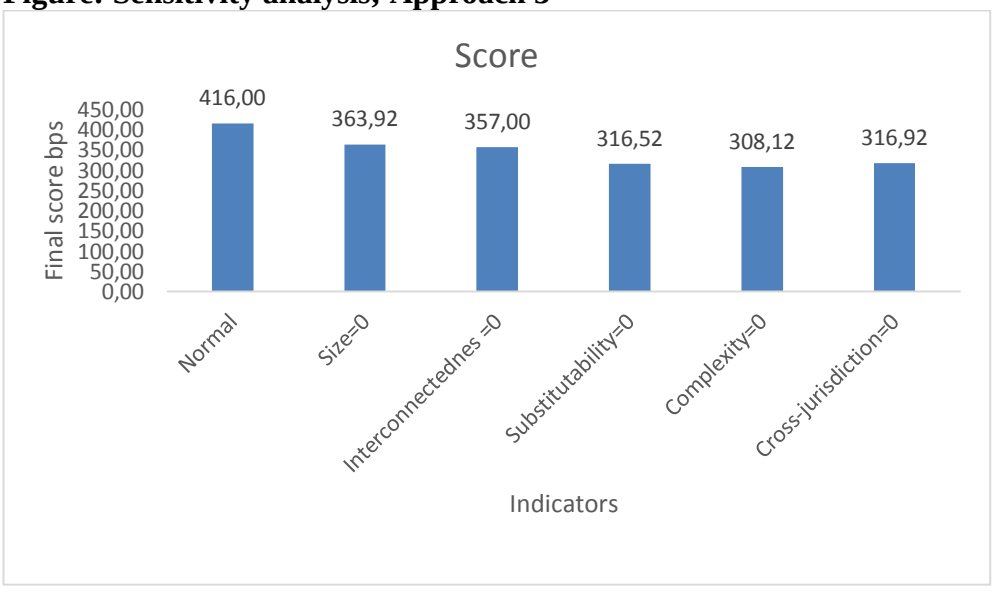
4.2.3 Approach 3: Making each particular indicator equal to zero

Third approach will make each particular indicator equal to zero, but not eliminating the indicator. This means that all other indicators will remain with the same weight of 20%, except the tested one which is 0%. Category scores from table 6 will be used.

Final score for each eliminated indicator is as follows:

- *Size* = 0%: (0 + 297.6 + 500 + 542 + 480) ÷ 5 = 363.92 bps
- *Interconnectedness* = 0%: (263 + 0 + 500 + 542 + 480) ÷ 5 = 357.00 bps
- *Substitutability* = 0%: (263 + 297.6 + 0 + 542 + 480) ÷ 5 = 316.52 bps
- *Complexity* =0%: (263 + 297.6+ 500 + 0 + 480) ÷ 5 = 308.12 bps
- *Cross-jurisdictional activity* =0%: (263 + 297.6+ 500 + 542 + 0) ÷ 5 = 316.95 bps

Figure: Sensitivity analysis; Approach 3



Source: Author's computation

The third approach is slightly different from previous two, because when weight of one particular indicator is decreased to zero, weight of other indicators is not increased and it remains same at 20%. So the final results are going to be lower than the normal one. The figure above shows final results of each situation, when each particular indicator is weighted 0% and others remain at 20%, compared to normal situation, when all indicators weigh 20%. First situation shows *Size* indicator equal to 0%, and the final

result is lower and equal to 363.92bps. So the Deutsche bank will remain in the same bucket, third bucket, with capital requirements at +2.0% CET1. The same will happen for *Interconnectedness*, which final score is 357.00. Other three situations where *Substitutability*, *Complexity* and *Cross-jurisdictional activity* are equal to zero, is different as the results are much lower. In these three situations the final scores are under the lower bound of third bucket, which is 330bps, with the *Complexity* being at minimum of all three approaches at 308.12bps. In these three situations Deutsche bank will be allocated to a lower, second bucket, with lower capital requirements +1.5% CET1. This Figure shows that *Size* has the lowest impact on the final score and that *Complexity* has the highest impact on final score.

4.3 Conclusion on Sensitivity analysis

Analyses above illustrates how important is each particular indicator in calculating the final score for Deutsche bank, and allocating the bank to a bucket with specific higher capital requirements. From the first two approaches it can be clearly seen that first two indicators *Size* and *Interconnectedness* don't play a big role in calculating the final result as when their weight is decreased to 10% or to 0%, the final score is above normal. With the *Size* having the highest score, suggesting that the *Size* is the least weighted indicator among all. Other three indicators *Substitutability*, *Complexity* and *Cross-jurisdictional activity* show that they are much more important than the first two. When their weight is decreased to 10% or to 0%, the final score is below normal. With the *Complexity* having the lowest final score, suggesting that *Complexity* is the highest weighted indicator among all.

Third approach is slightly different from the previous two, but shows the same conclusion. When *Size* is eliminated, the final result decreased the least suggesting than *Size* indicator does not have big influence. On the other side *Complexity* indicator decreased the final result the most, suggesting it has the biggest influence. Indicators can be ordered by their weight from lowest to highest: *Size*, *Interconnectedness*, *Cross-jurisdictional activity*, *Substitutability* and highest *Complexity*.

But it must be noted that there is an upper cap on *Substitutability* which is 500, and its real score was 637.6. It can be seen in Table 6: Category score calculations. If there was no cap, *Substitutability* would increase its importance way above all other indicators.

5 Impact of requiring additional loss absorbency for G-SIB

The Macroeconomic Assessment Group (MAG) was requested by the Basel Committee and the FSB, which has assessed the macroeconomic impact of the Basel III reforms, to undertake an assessment of the impact of the G-SIFI recommendations.

The MAG is mainly focused on the role of G-SIBs in issuing credit to the non-financial private sector, and their broader role in the financial system as proxies by their share of financial system assets. The methodology which was used by the MAG (2010) shows generated paths for the GDP impact of higher capital ratios on *all* internationally active banks that were the basis of the MAG's December 2010 assessment. The MAG (2010) report has described the impact on growth per percentage point of additional bank capital in a representative national financial system. The results when implementation was over an eight year horizon, the report concluded that annual growth would slow down by approximately 2 basis points per year on average. If implementation took place for a smaller period of time, like over four years, the equivalent number is 4 basis points on average. These correspond to peak GDP impacts of 0.17% and of 0.19% of GDP, respectively. In these two cases, the estimates show recovery to the baseline over a two to three year period following the end of the transition.

The MAG (2010) has collected information on the importance of the G-SIBs in lending and total assets for each national financial system in order to provide an estimate of the scale of the likely impact of requiring a subset of institutions to hold additional capital. If we take into consideration the fifteen major economies represented on the MAG (2010), the share of lending to the non-financial private sector by the top 30 G-SIBs (ranked using the current application of the Basel Committee's methodology) ranges from about 4% to about 75%. The share of total banking-system assets is in the 9% to 77% range.

Meanwhile, the LEI report (2010) has been made which was based on findings of the Committee's long-term assessment of the economic costs and benefits associated with increasing regulatory capital requirements. So the results of MAG (2010) estimates suggest that the G-SIB framework should provide an annual benefit of about 40–50 basis points of GDP, reflecting the reduced probability of a systemic financial crisis. However the MAG (2010) also discusses in a qualitative way other factors that could have an impact on the results. For sure, more experience with the G-SIB framework will be needed in order to gain a better understanding of the nature and magnitude of such factors.

5.1 LEI – long term economic impact

The long-term economic impact (LEI, 2010) of Basel Committee's higher capital and liquidity requirements is described in this report. It elaborates on impact of stronger capital requirements on output and shows its economic benefits and costs:
Benefits:

- Firstly, Lower probability of next banking crises as well as their associated output losses are the most important benefits of additional capital requirements.
- Secondly, decreasing the amplitude of fluctuations in output during non-crisis periods

Costs:

- On the cost side, there could be that increase in lending rates which would lead to a decrease in the level of output while leaving its trend rate of growth unaffected.

All the empirical estimates have been taken into consideration, but the outcome still remains the uncertainty. Analysis suggests that if we compare benefits to costs that there are still some net benefits and that there is considerable room to tighten capital and liquidity requirements even more. In this report, two points are worth highlighting:

- First, the report is focused on the *long-run* economic impact. The assumption is that banks have completed the transition to the new levels of capital and liquidity. This was done by comparing two steady states. The benefits and costs of the transition phase are not included in this report. The Macroeconomic Assessment Group (MAG, 2011) considers the macroeconomic costs of this transition, but not its benefits.

- Second, this report does not indicate a particular calibration level. The BCBS was also informed about the results of Quantitative Impact Study.

The main point is that for a broad range of capital ratios net benefits remain positive, and most importantly gradually declining probability of banking crises. But to be real, the tradeoff between higher capital requirements and stricter liquidity standards, on the one hand, and the reduction in the probability of crises, on the other, is quite uncertain.

6 Instruments to meet higher loss absorbency requirements

The main aim of BCBS (2011) is to be sure that G-SIFI increase the proportion of their balance sheets funded by instruments which increase the resilience of the institution as a going concern. This should be done by additional loss absorbency requirement as said on G20 Summit. So the primary objective is the going-concern. In this section we discuss various possibilities of how to meet the additional loss absorbency requirement.

6.1 Common Equity Tier 1 (CET1)

In a new edition of Basel III (2011) definition of capital, a key element is Common Equity Tier 1. It should secure that a bank remains a going concerns as it is capable of fully absorbing losses and represents the highest quality component of a bank's capital.

On the other hand, the most costly form of capital for banks to raise is Common Equity Tier 1. CET1 should reducing the funding advantages of G-SIBs that arise from expectations of public sector support and therefore help to level the playing field in the banking sector. According to BCBS (2011) Tier 1 to be the simplest and most effective way for G-SIBs to meet their additional loss absorbency requirement.

According to Basel III Definition of Capital (June 2011), Common Equity Tier 1 capital consists of the sum of the following elements:

- Common shares issued by the bank that meet the criteria for classification as common shares for regulatory purposes (or the equivalent for non-joint stock companies);
- Stock surplus (share premium) resulting from the issue of instruments included Common Equity Tier 1;
- Retained earnings;
- Accumulated other comprehensive income and other disclosed reserves;
- Common shares issued by consolidated subsidiaries of the bank and held by third
  Parties (i.e. minority interest) that meet the criteria for inclusion in Common Equity Tier 1 capital. See section 4 for the relevant criteria; and
- Regulatory adjustments applied in the calculation of Common Equity Tier 1

Retained earnings and other comprehensive income include interim profit or loss. National authorities may consider appropriate audit, verification or review procedures. Dividends are removed from Common Equity Tier 1 in accordance with applicable accounting standards. The treatment of minority interest and the regulatory adjustments applied in the calculation of Common Equity Tier 1 are addressed in separate sections.

6.2 Low-trigger contingent capital (Gone-concern contingent capital)

Or as well called Gone-concern contingent capital, is a debt security designed to absorb losses when a financial firm is at the point of non-viability or insolvency. As stated before, the main objective of additional loss absorbency requirement is the going-concern. So BCBS (2011) is of the view that it is not suitable for G-SIBs to be able to meet this requirement with instruments that only absorb losses at the point of non-viability or insolvency**.**

6.3 High-trigger contingent capital (Going-concern contingent capital)

As described by Basel Committee: „Going-concern contingent capital is used here to refer to instruments that are designed to convert into common equity whilst the bank remains a going concern (i.e. in advance of the point of non-viability). " So the difference between Gone and Going-concern contingent capital is that they differ in timing. Going-concern contingent capital operates well before resolution mechanism. And contingent capital is a debt that can be converted into equity during financial crises. As said at the beginning of this paper, it is what has happened to Royal Bank of Scotland. RBS was funded by government during the crisis, so the government has bought their debt and now there is debt but just a promise.

There is a less scope for regulatory discretion because a bank is "triggered" through a more objective process and thus at a time when recapitalization occurs there is still significant enterprise value. According to Goldman Sachs (2011) „For investors to view objective triggers as credible, however, better and more-standardized bank disclosures will be needed on a regular basis. Because this type of contingent capital triggers early, when losses are still limited, it can be issued in smaller tranches. This, in turn, allows for greater flexibility in structuring its terms. "

When a recapitalization occurs at an early stage, control of the firm can shift from existing shareholders to the contingent capital holders, like what happened with RBS when it became 80% Government owned.

Table 12: A snapshot of gone- and going-concern contingent capital

	Gone-concern contingent capital	Going-concern contingent capital
Overview	- Operates at the point of non-viability - Significant regulatory discretion is usually involved - Financial liabilities are made clearly junior to business ones - Should be thought of as a resolution mechanism	- Operates well before resolution mechanisms come into play - Recapitalization occurs when significant enterprise value still remains - Control of the firm may shift when contingent capital is triggered, and a change in management may occur, creating incentives for banks to de-lever and de-risk earlier
Other considerations	- Enhanced and standardized disclosures are crucial	

Source: Goldman Sachs (2011)

6.4 Conclusion on use of contingent capital

Based on costs and benefits of contingent capital, Basel Committee has decided that the Common Equity Tier 1 is the only way how to meet their additional loss absorbency requirement. This doesn't mean that the BCBS will stop reviewing contingent capital. They will continue to support the use of contingent capital to meet higher national loss absorbency requirements, because high-trigger contingent capital is a good way how to absorb losses on a going concern basis.

7 Conclusion

During the recent financial crisis that started in 2007 real economy was harmed because of failure or impairment of a number of large, global financial institutions which sent shocks through the financial system. Options to prevent the problems were limited by supervisors and other relevant authorities, so the individual firms were affected. So the only solution which was necessary to help this financial system was the public sector intervention during crisis. As a result the world went through big financial and economic costs and associated increase in moral hazard. It was necessary to introduce some new additional measures to reduce the probability as well as impact from the failure of global systemically important financial institutions (G-SIFIs).

This paper is mainly based on capital retirements and which are applied to all internationally active banks. The main indicators that show how systematically important is the bank are *Size, Interconnectedness, Complexity,* lack of *Substitutability* and global scope. These institutions are seen to be so important that are perceived as not being allowed to fail.

As BCBS said, the aim of these new polices is to:

- reduce the probability of failure of G-SIBs by increasing their going-concern loss absorbency; and
- Reduce the extent or impact of failure of G-SIBs, by improving global recovery and resolution frameworks.

This paper sets out the proposal from the Basel Committee on the assessment methodology for global systemic importance and the magnitude of additional loss absorbency that G-SIBs should have. After, this assessment methodology is applied in the case of Deutsche bank. Evidence on indicators was found on Deutsche bank official web page, BCBS methodology was applied and the bank was allocated to the bucket. Because of some criticism on indicators from world banks, sensitivity analyses on weight of particular indicators were done. There are more types of analyses and all of them clearly illustrates each particular indicator is important in calculating the final score. Than this paper elaborates on Impact of new capital requirements, ways how to meet these requirements and the arrangements by which they will be phased in.

As calculation for indicator based measurement approach is not available, this paper has applied the methodology to Deutsche bank indicators published on their official web page. When the indicator based measurement approach was applied to, the results confirm that the Deutsche bank should be seen as GSIB and allocated by BCBS to a right bucket. The paper shows the whole procedure from basic indicators uploaded by bank up to the final list of all G-SIB. Firstly based on Deutsche bank indicators and BCBS denominators the indicator score was found for each particular indicator. Based on Indicator score, Category score was calculated. Then the Final score for Deutsche bank was 416.52 bps. After that the allocation to buckets with different higher capital requirements was done and Deutsche bank should be allocated to third bucket with

+2% CET1 according to the results, which is the same bucket where BCBS has allocated Deutsche bank. Also a Phase-in period for Deutsche bank up to 2019 can be seen. The methodology ends up with the final list on G-SIB.

After the bank was allocated, the sensitivity analyses were done for each particular indicator. Analyses clearly state how important is each particular indicator in calculating the final score for Deutsche bank, and allocating the bank to a bucket with specific higher capital requirements. From the first two approaches it can be clearly seen that first two indicators *Size* and *Interconnectedness* don play a big role in calculating the final result as when their weight is decreased to 10% or to 0%, the final score is above normal. With the *Size* having the highest score, suggesting that the *Size* is the least weighted indicator among all. Other three indicators *Substitutability, Complexity* and *Cross-jurisdictional activity* show that they are much more important than the first two. When their weight is decreased to 10% or to 0%, the final score is below normal. With the *Complexity* having the lowest final score, suggesting that *Complexity* is the highest weighted indicator among all.

Third approach is different from the previous two, but shows the same conclusion. When *Size* is eliminated, the final result decreased the least suggesting than *Size* indicator does not have big influence. On the other side *Complexity* indicator decreased the final result the most, suggesting it has the biggest influence. Indicators can be ordered by their weight from lowest to highest: *Size, Interconnectedness, Cross-jurisdictional activity, Substitutability* and highest *Complexity*.

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Appendix A: Sensitivity analysis: Reducing the weight of each particular indicator to 10%

This part shows how were the results obtained in part 4.2.1 and describes the calculation in detail.

Table: Final score; *Size*= 10%

Category	Indicators	score
Size = 10%	263 * 0.1 =	26.3
Interconnectedness = 22.5%	(392 + 318 + 183) * 0.225 =	62.91
Substitutability=22.5%	(890 + 311 + 712) * 0.225 =	112.5
Complexity=22.5%	(774 + 393 + 459) * 0.225 =	121.95
Cross-jurisdictional activity=22.5%	(482 + 478) * 0.225 =	108
Sum		431.66

Source: Author's computations

Table: Final score; *Interconnectedness* = 10%

Category	Indicators	score
Size = 22.5%	263 * 0.225 =	59.175
Interconnectedness = 10%	(392 + 318 + 183) * 0.1 =	27.96
Substitutability=22.5%	(890 + 311 + 712) * 0.225 =	112.5
Complexity=22.5%	(774 + 393 + 459) * 0.225 =	121.95
Cross-jurisdictional activity=22.5%	(482 + 478) * 0.225 =	108
Sum		429.585

Source: Author's computations

Table: Final score; *Substitutability*=10%

Category	Indicators	score
Size = 22.5%	263 * 0.225 =	59.175
Interconnectedness = 22.5%	(392 + 318 + 183) * 0.225 =	62.91
Substitutability=10%	(890 + 311 + 712) * 0.1 =	50
Complexity=22.5%	(774 + 393 + 459) * 0.225 =	121.95

Cross-jurisdictional activity=22.5%	(482 + 478) * 0.225 =	108
Sum		402.035

Source: Author's computations

Table: Final score; *Complexity*=10%

Category	Indicators	score
Size = 22.5%	263 * 0.225 =	59.175
Interconnectedness = 22.5%	(392 + 318 + 183) * 0.225 =	62.91
Substitutability=22.5%	(890 + 311 + 712) * 0.225 =	112.5
Complexity=10%	(774 + 393 + 459) * 0.1 =	54.2
Cross-jurisdictional activity=22.5%	(482 + 478) * 0.225 =	108
Sum		396.785

Source: Author's computations

Table: Final score; *Cross-jurisdictional activity*=10%

Category	Indicators	score
Size = 22.5%	263 * 0.1 =	59.175
Interconnectedness = 22.5%	(392 + 318 + 183) * 0.225 =	62.91
Substitutability=22.5%	(890 + 311 + 712) * 0.225 =	112.5
Complexity=22.5%	(774 + 393 + 459) * 0.225 =	121.95
Cross-jurisdictional activity=10%	(482 + 478) * 0.1 =	108
Sum		404.535

Source: Author's computations