AN ADDITIONAL CAPITAL REQUIREMENT BASED ON THE DOMESTIC SYSTEMIC IMPORTANCE OF A BANK

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This article is concerned with the regulation of banks on the basis of their different degrees of systemic importance. It proposes a specific approach to calculating a bank's systemic importance to the domestic banking sector. The article goes on to propose a method for assessing the additional capital requirement for a bank based on the estimated cost impacts of failure of the bank on the Czech financial sector and the economy as a whole. The proposed approach is used to obtain systemic importance scores and capital buffers for individual banks in the Czech Republic. According to the calculations, the highest capital buffer is 4%. However, a non-zero capital buffer should not be interpreted as a signal that the bank is too big to fail and would therefore be guaranteed a public bail-out if it got into difficulties.

1. INTRODUCTION

The financial crisis in recent years has reignited the debate on how financial sector regulators should take into account the size and significance of financial institutions and thus also the impacts that their failure would have on the stability of the financial sector and the economy as a whole. This debate has led to efforts to estimate the systemic importance of individual institutions and, based on the results, to set regulations that reduce an institution's risk of failure and motivate it to reduce its systemic importance itself.

Given how the financial crisis unfolded, attention was focused first on the banking sector, as it was the hardest hit area of the economy at the start of the crisis. In late 2011, the Basel Committee on Banking Supervision (BCBS) published a methodology for determining a bank's global systemic importance, i.e. the impact that its failure would have on the global economy. It also proposed actions that regulatory authorities should take against banks displaying extremely high global systemic importance.

In late 2012 the BCBS published a document containing rules for calculating a bank's systemic importance to the domestic economy. This publication, however, leaves the assessment of suitable regulatory actions against banks based on their domestic systemic importance to the competent home regulatory authority. As the Czech Republic is a member of the EU, the key factor as regards regulation based on systemic importance will be the form in which these BCBS guidelines are incorporated into the regulatory legislation of the EU, specifically the directive and regulation on capital adequacy.

Komárková at al. (2012) applied a slightly modified version of the BCBS methodology for measuring the global systemic importance of banks to the Czech banking sector. The present article is a follow-up to that study and proposes an approach to determining the domestic systemic importance of individual banks and setting appropriate additional capital requirements on the basis of the systemic importance scores obtained. It then applies this approach to the Czech banking sector.

The calculation results are described in this article in a way that makes it impossible to identify individual Czech banks. The method proposed in the article is designed for use as an analytical basis for future decision-making at the CNB on what additional capital requirements individual banks in the Czech Republic should meet on the basis of their systemic importance. However, it is not a final methodology: when deciding on which banks to apply a D-SIB buffer to, and how large the buffer should be, the CNB may take into account indicators and approaches other than those proposed in the article.

The article is structured as follows. Section 2 summarises the principles of the BCBS proposals for the regulation of systemically important institutions. The following two sections describe ways in which the BCBS proposals could be applied to the Czech financial sector. Section 5 summarises the results obtained, Section 6 verifies those results and Section 7 briefly describes the general relationship between systemic importance and "too big to fail" status. Section 8 summarises the main findings.

2. REGULATION BASED ON THE SYSTEMIC IMPORTANCE OF BANKS: CURRENT SITUATION

The BCBS distinguishes two types of systemic importance of a bank: the degree to which it is systemically important to the global economy (hereinafter its "G-SIB score") and the degree to which it is systemically important to the domestic economic system (hereinafter its "D-SIB score"). Theoretically, various combinations of G-SIB scores and D-SIB scores can occur in different countries. In practice,

though, it can be assumed that most globally important banks are also important in the context of the domestic financial sector. However, the opposite does not apply, i.e. most domestically important banks will be of low global systemic importance.

The BCBS concentrated initially on developing a proposal to regulate banks with high G-SIB scores. According to BCBS (2011b), such scores should be based on five categories of indicators: (1) size, (2) interconnectedness, (3) substitutability, (4) complexity and (5) cross-jurisdictional activity.

BCBS (2011b) also defines a specific method for calculating G-SIB scores so as to ensure that they are comparable and uniformly interpreted across the world. Komárková et al. (2012) gives more detailed information on how to calculate G-SIB scores.

BCBS (2011b), in combination with another regulatory document FSB (2011), then defines two regulatory requirements for banks based on their G-SIB scores. First, a resolution and recovery plan should be drawn up for banks whose G-SIB score exceeds a certain threshold. Second, each bank should be subject to an additional capital requirement functioning as a "capital conservation buffer" (see BCBS, 2011a). This G-SIB capital buffer should be derived from the bank's G-SIB score.

After defining an approach to calculating G-SIB scores and related regulatory requirements, the BCBS turned its attention to the issue of determining banks' D-SIB scores and related requirements. The results are summarised in BCBS (2012), which proposes a similar approach to calculating D-SIB scores as in the case of G-SIB scores, with just a few modifications. The main difference is obviously that D-SIB scores relate to the domestic, not the international, financial sector and real economy. The other major modifications for calculating D-SIB scores are the following:

- There is no explicitly defined method for calculating D-SIB scores, as international harmonisation is not necessary in this area (no specific indicators or weights are defined).

- The D-SIB score calculation will not be based on the bank's cross-jurisdictional activity. It will thus be based only on the first four categories of indicators listed above, i.e. size, interconnectedness, substitutability and complexity. Specifically for complexity, however, BCBS (2012) states explicitly that this may arise partly from cross-border activity.

- The D-SIB score calculation may also be based on other indicators that the domestic regulator deems relevant. For example, the document allows national authorities to use the bank's size relative to domestic GDP and its wholesale funding ratio. However, these indicators must be set with regard to the specifics of the national economy and financial sector.

Another important modification in the approach to domestic institutions with different degrees of systemic importance is the absence of a requirement to draw up resolution and recovery plans for individual banks exceeding a certain D-SIB score. In the context of D-SIBs it is sufficient to have a general (but practicable and effective) resolution plan enacted in the national legislation.

BCBS (2012) proposes to apply an additional capital requirement to any given bank based on its D-SIB score, i.e. a D-SIB capital buffer.[1] BCBS (2012) gives only a few general principles for the D-SIB buffer assessment methodology and expects domestic regulatory authorities to conduct their own analyses and to use them to tailor the methodology to national circumstances.

The fundamental parameters for the regulation of the banking sector of the Czech Republic – as an EU member – are laid down in union-wide legislation. The proposals tabled by the BCBS (2011b, 2012) should be broadly incorporated into the Capital Requirements Directive (CRD), specifically the fourth revision thereof, abbreviated as CRD IV. However, the final version of CRD IV was not known at the time of writing. Therefore, we will base our following considerations and calculations on the BCBS proposals and not on CRD IV.

3. METHOD FOR CALCULATING THE SYSTEMIC IMPORTANCE OF BANKS IN THE CZECH REPUBLIC

As indicated in the previous section, the additional capital requirement based on the systemic importance of a bank to the domestic economy is calculated in two steps:

(1) calculation of the D-SIB score for each bank,

(2) calculation of the D-SIB buffer for each bank.

We will start by briefly discussing the first step. The second step will be dealt with in Section 4.

1 If a G-SIB capital buffer also applies to the bank in question, the higher of the two values is used.

TABLE 1

CATEGORIES AND INDICATORS OF SYSTEMIC IMPORTANCE

Category	Indicator
Size	Total exposures
Interconnectedness	Claims on FIs
	Liabilities to FIs
	Wholesale funding ratio
	Concentration of claims on FIs*
	Concentration of liabilities to FIs*
Substitutability	Assets under custody
	Volume of payments cleared and settled through payment system
	Number of payments cleared and settled through payment system*
	Primary deposits*
	Loans provided to non-financial corporations*
	Size of Czech government bond portfolio*
Complexity	OTC derivatives notional value
	Held for trading and available for sale value
	Claims on non-residents
	Liabilities to non-residents
	Assets in regulated consolidated group*
	Number of organisational units*
	Number of employees*
	NPL-to-asset ratio*

Source: BCBS (2011b, 2012), CNB
Note: * denotes non-BCBS indicators.

In contrast to the G-SIB methodology, the BCBS does not go into detail on the indicators that belong to each category or on the method for calculating the D-SIB score itself. However, it is appropriate to use the international global systemic importance methodology as a basis and just tailor it to the domestic systemic importance context. The resulting list of indicators used in this article to calculate the D-SIB scores of individual banks is given in Table 1. The list differs from the G-SIB methodology only in a few minor respects; non-BCBS indicators are marked with an asterisk.[2]

As in the G-SIB methodology, an equal weight of 25% is given to each of the categories of indicators, with each indicator equally weighted within its category. For each bank, the score for a particular indicator is calculated by dividing the relevant accounting value for the bank by the accounting value for the banking sector as a whole; for indicators that are ratios we calculate the score for a particular bank by dividing the individual bank ratio by the aggregate ratio summed across all banks. The aim of this approach is to ensure that the score for each indicator for each bank lies between 0 and 1 and the sum of the scores for each indicator across all banks in the sample is equal to 1. This calculation gives the degree of systemic importance, i.e. the D-SIB score, for each bank in the sector. The sum of the D-SIB scores across all banks in the sector is thus equal to 1 by definition. The score obtained in this way for a given bank is then used to determine the bank's capital buffer based on its systemic importance.

4. ADDITIONAL CAPITAL REQUIREMENT CALCULATION METHOD

In line with the BCBS publications, we start with the following assumptions set out in Basel III when determining the capital buffer based on the D-SIB score:

(i) Each bank must meet a minimum capital requirement for Core Tier 1 capital (CT1) of k_{min} = 4.5% of risk-weighted assets.[3] CT1 is composed of common stock and retained earnings, i.e. capital that can be used immediately and unconditionally to cover any losses of the bank.

(ii) In normal circumstances, each bank additionally holds the full basic component of the CT1 capital conservation buffer[4] of k_{basic} = 2.5% of risk-weighted assets.

(iii) In normal circumstances, a bank with a D-SIB score equal to *sib* should comply not only with k_{min} and k_{basic}, but also with the D-SIB buffer, i.e. the full D-SIB component, *k(sib)*, of the CT1 conservation buffer.

Consequently, of the three components of the total CT1 capital requirements listed above, only *k(sib)* is sensitive to the bank's D-SIB score.

If the capital of the bank falls below $k_{min} + k_{basic} + k(sib)$, the bank must take remedial action whose intensity (and thus also the costs to the economy arising from the situation) is proportional to the decline in capital. In what follows,

2 In comparison with Komárková et al. (2012), some of the non-BCBS indicators have been chosen in an easier to interpret form (e.g. simple shares in the total are used instead of indicators based on network analysis of the payment system) and some additional indicators are also used (e.g. the size of the Czech government bond portfolio). As the set of indicators for the G-SIB calculation overlaps to a large extent with the set of indicators chosen in this article for the D-SIB score calculation, the resulting scores in this article (see Section 5) are relatively similar to those in Komárková et al. (2012).

3 Due to the inaccessibility of historical data on values of the Common Equity Tier 1 (CET1) capital, the present calculations were done using Core Tier 1 (CT1) capital. For the Czech banking sector, the difference between actual volumes of both types of capital is negligible.

4 We use the descriptor "basic" here because the total conservation buffer also includes a D-SIB buffer and a countercyclical buffer (where introduced).

the situation where, as a result of a large negative profit in the quarter, the bank's CT1 falls below the regulatory minimum k_{min}, i.e. it records a negative quarterly profit of $-[k_{basic} + k(sib)]$ or lower, will be referred to as distress (this need not mean a straightforward fall in the sense of a loss of licence). The probability $P(sib)$ of distress for a bank with a D-SIB score of *sib* is obviously lower for a higher D-SIB capital buffer $k(sib)$, i.e. for a higher level of *sib*. We denote the costs to the economy arising from the distress of a bank with a D-SIB score of *sib* as $C(sib)$.

The capital buffer is then determined on the basis of the "equal expected impact" principle. This principle can be generally expressed as follows: the expected costs to the economy resulting from distress of any bank that is systemically more important than a reference bank chosen by the regulator should be the same as the expected costs to the economy resulting from distress of the reference bank.[5]

According to the expected impact principle, the point of the D-SIB buffer is to reduce the probability $P(sib)$ of distress of the bank such that the *expected* costs of this situation, i.e. $C(sib)*P(sib)$, are equal to the expected costs of distress of the reference bank, i.e. $C(sib^R)*P(sib^R)$. It is obvious that the D-SIB buffer will be zero for the reference bank and for every systemically less important bank.

4.1 Calculation based on the return on risk-weighted assets

BCBS (2011b) uses two methods to determine the SIB buffer according to the expected impact principle. The first method uses a Merton model to estimate a bank's market-perceived probability of failure from the market prices of its equity (see, for example, Seidler, 2008). The second method is based on the historical frequency distribution of the return on risk-weighted assets (RORWA – see Kuritzkes and Schuermann, 2010). As the shares of only one Czech bank are traded on public markets, the Merton model has limited application in the Czech banking sector. For this reason, the RORWA method is used in this study.

The expected impact principle can be expressed formally as follows: for all $sib \geq sib^R$, $P(sib)$ should satisfy

$$P(sib)C(sib) = P(sib^R)C(sib^R),$$
$$P(sib) = P(sib^R)/[C(sib)/C(sib^R)]. \quad (1)$$

In order to derive the values of $P(sib)$ and subsequently also the capital buffer $k(sib)$ based on the bank's *sib*, we first need to determine the value of $P(sib^R)$. The first step is to choose the level of sib^R itself. While the *sib* for each bank is given by the empirically observed levels of the various indicators for that bank, sib^R has to be determined on the basis of regulatory considerations. Setting sib^R equal to q times the average *sib* for the entire Czech banking sector (where it makes sense only to consider values of $q > 1$) would seem to be an acceptable and transparent method and is the one we will keep to in this article. The value of q is chosen at the discretion of the regulator depending on how strict it wants the D-SIB buffer regime to be: the lower q is, the higher the buffers will be; moreover, reducing q may expand the set of banks to which the buffers will apply. For the following calculations we choose $q = 2$.

Assumptions (i)–(iii) listed above and the assumption $k(sib^R) = 0$ imply that $P(sib^R)$ corresponds to the probability that the bank will make a negative profit of

$$-[k_{basic} + k(sib)] = -(2.5 + 0) = -2.5\% \text{ of } RWA$$

or lower. With the historical RORWA distribution, this is therefore the relative frequency of cases where $\text{RORWA} \leq -2.5\%$. If we simultaneously interpret the historical RORWA distribution as being the RORWA probability distribution in the future, then

$$P(sib^R) = p(RORWA \leq -2.5\%).$$

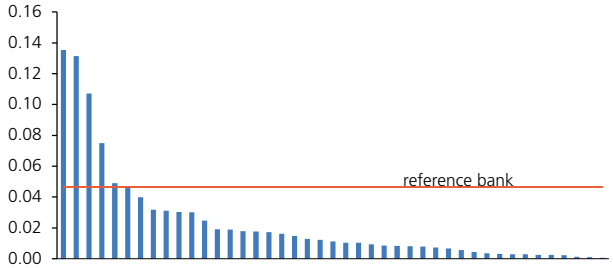
To calculate $P(sib)$ from equation (1) we now need to determine the value of $C(sib)/C(sib^R)$. In accordance with intuition and with a proposal contained in BCBS (2011b), we can assume for simplicity that this ratio can be approximated as sib/sib^R. Using the historical RORWA distribution we can then derive the minimum capital loss for each level of $P(sib)$.

The capital requirement $k_{basic} + k(sib) = 2.5 + k(sib)$ should be of an amount covering this loss. This gives us the D-SIB capital buffer $k(sib)$ based on the degree of systemic importance of the bank.

5 Besides the expected impact approach, BCBS (2011b) uses the results of other approaches (models created by the Macroeconomic Assessment Group and a method based on the implicit subsidies that some highly systemically important banks receive because the market considers them to be too big to fail, i.e. it expects public money to be spent on bailing them out if they get into difficulty). These approaches, however, are difficult to apply to the Czech banking sector.

CHART 1

D-SIB SCORES OF INDIVIDUAL BANKS IN THE CZECH REPUBLIC
(x-axis: ranking of banks by D-SIB score; y-axis: D-SIB score)



Source: Authors' calculations
Note: The "reference bank" line indicates a D-SIB score of double the sector average.

TABLE 2

VALUES OF KEY PARAMETERS

Excluding first:	Parameter	
0 quarters	$P(sib^R)$	0.016
	$P(sib)$ for highest *sib*	0.005
	Exact D-SIB buffer for highest *sib* (% of RWA)	5.48
4 quarters	$P(sib^R)$	0.006
	$P(sib)$ for highest *sib*	0.002
	Exact D-SIB buffer for highest *sib* (% of RWA)	3.87

Source: CNB, authors' calculations

5. RESULTS

We include all banks active in the Czech Republic since the start of 2002 (including building societies and branches of foreign banks) in the sample of banks for which we are determining D-SIB scores and D-SIB buffers. The sample therefore contains both "original banks" which entered the Czech market before 2002 and "new banks" which entered this market after 2002 Q1.

We chose 2002 as the start of the data sample. For pre-2002 data there is a risk that the figures are too distorted by the previous privatisation of banks, the related clean-up of their balance sheets and similar transformation processes, which cannot be considered standard bank finance factors. On the other hand, 2002 saw the last two cases of traditional banks having their licences revoked (Union Banka and Plzeňská banka), so the data sample will not be distorted by not containing any cases of adverse changes in banks' finances.

To determine the D-SIB buffer, we use the quarterly RORWA time series for each bank, calculated as the bank's after-tax profit divided by the value of its risk-weighted exposures.

The resulting D-SIB scores of the individual (anonymised) banks for the relevant indicator values at the end of 2011 are shown in Chart 1. The horizontal line in the chart indicates the D-SIB score of the hypothetical reference bank (i.e. sib^R), which we need to determine in order to be able to set the D-SIB buffer. The set of banks for which $sib > sib^R$, and therefore to which a non-zero D-SIB buffer should apply, has six members.

Table 2 summarises the resulting value of $P(sib^R)$, i.e. $P(sib)$ for the reference bank, and subsequently $P(sib)$ and the corresponding D-SIB buffer [i.e. $k(sib)$] for the bank that had the highest D-SIB score in the Czech banking sector according to the end-2011 data.

The calculation must take into account the fact that the finances of new banks can initially be significantly distorted by specific start-up costs. In this article, therefore, the calculations ignoring the first four quarters after banks enter the market are regarded as the baseline. The D-SIB buffer for the bank with the highest D-SIB score should be 3.87% of risk-weighted assets. In regulatory practice, however, it is more appropriate to categorise banks into "classes" by rounding up their exactly calculated D-SIB buffers to the nearest half per cent, for example. An exact D-SIB buffer of 3.87% will thus be rounded to 4.0%.

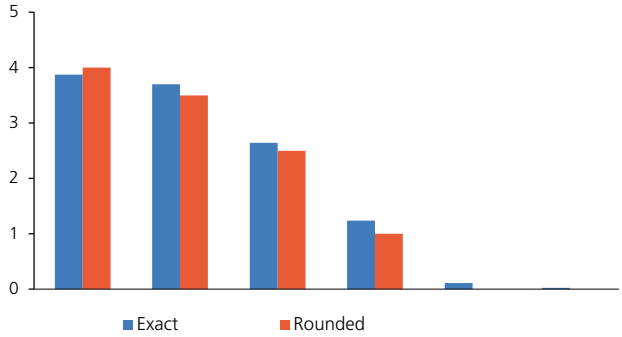
Chart 2 shows the exact and rounded results of the D-SIB buffer calculation for all banks in the Czech Republic whose D-SIB scores are higher than sib^R and whose D-SIB buffers are therefore above zero. Each pair of columns in this chart corresponds to a single bank and illustrates its exact capital buffer and its buffer rounded to the nearest half per cent. Banks are ranked in descending order of D-SIB score (and thus also exact D-SIB buffer).

As mentioned above, $q = 2$ implies that the D-SIB buffer regime should apply to six banks. However, it is clear from Chart 2 that due to rounding the resulting D-SIB buffer of banks five and six is zero (even though their D-SIB scores slightly exceed that of the reference bank).

The given specific D-SIB scores and also the D-SIB buffers are based on the parameters of individual banks and the banking sector as a whole as of the end of 2011 and on the financial results of all banks since the start of 2002. In the future, therefore, they may change depending on how the parameters of individual banks and the whole banking sector change and on how the banks' financial results develop.

CHART 2

D-SIB BUFFERS OF INDIVIDUAL BANKS IN THE CZECH REPUBLIC
(x-axis: ranking of banks by D-SIB score; y-axis: D-SIB buffer in % of risk-weighted assets)



Source: Authors' calculations

Buffer rounding is a stabilising factor in the sense that it reduces the frequency of change in the D-SIB buffer level. The resilience of buffers to excessive volatility can be further enhanced by calculating D-SIB scores not from the values of source indicators as of a single date, but from longer-term averages. On the other hand, the stability of D-SIB buffers must not excessively limit their "motivational" effect: it must not lead to a situation where a bank's efforts to reduce its D-SIB buffer by reducing its systemic importance take too long to bear fruit.

6. CALCULATING CAPITAL BUFFERS USING STRESS TESTS

As stated in BCBS (2010), stress tests, which are used to assess the resilience of the banking sector to adverse shocks, can alternatively be used to calculate capital buffers. Stress tests indicate how sensitive banks are to particular risks and how the materialisation of such risks will affect their capital adequacy ratios. From this perspective, therefore, it is possible to use stress tests to identify the amount of capital that individual banks should maintain above the currently set minimum limit to ensure that their capital does not fall below the critical level k_{min} even if an adverse scenario materialises. Consequently, stress tests can serve to some extent as an ancillary method for determining D-SIB buffers. One should bear in mind, however, that stress tests capture the impact of risks to banks' capital adequacy which pertain solely to a particular predefined stress scenario. If a different scenario were chosen, the stress tests might lead to different results and thus also to a different amount of missing capital. This constraint should be borne in mind when calculating capital buffers using stress tests.

For the purposes of this article, we use the *Protracted Depression* stress scenario described in more detail in the main text of this Financial Stability Report. The scenario is reflected in a sustained recession and substantial banking sector loan losses in the domestic economy.

On the basis of the stress scenario, we can thus identify for each bank the capital losses generated by adverse developments coupled with risk materialisation and hence how much additional capital the bank would have to hold (if it entered the tests with only the minimum capital level of 7% of CT1) in order not to fall below the limit of 4.5% of CT1. For most banks included in the test, the capital buffers based on stress tests are roughly comparable with those presented in the previous section of this article; minor differences may arise for individual banks because some banks are more sensitive to the risks associated with the chosen stress scenario than other banks, which, conversely, might be more vulnerable to risks not envisaged in the stress scenario.

7. SYSTEMIC IMPORTANCE VERSUS TOO BIG TO FAIL STATUS

Another question linked to the systemic importance and D-SIB score of a bank is whether a bank whose systemic importance exceeds a certain threshold is automatically considered so important that it will be bailed out from the public purse if it gets into difficulty. Such banks are referred to as too big to fail (TBTF). This can lead to moral hazard, with banks that enjoy such status relying on state intervention and taking excessive business risks.

On the face of it, the result of the D-SIB buffer calculation can be regarded as a distribution of all banks into those with a zero D-SIB buffer (a D-SIB score lower than the reference bank's) and those with a positive buffer which rises as a function of the bank's D-SIB score. This binary distribution of banks into "banks without a buffer" and "banks with a buffer" may be interpreted by the markets as a signal that removes the uncertainty about public bail-outs in the following sense: "If a non-zero D-SIB buffer is imposed on a bank, the bank is so important that the state will want to rescue it, i.e. it enjoys absolute too big to fail status; by contrast, a bank with a zero D-SIB buffer is relatively unimportant and will thus not be rescued".

Many texts on the determination of D-SIB buffers indirectly support this not necessarily correct inference. For example, Brämer and Gischer (2011) state that the BCBS methodology for determining the systemic importance of

banks is focused on identifying TBTF banks (and on suitably tightening the regulation of such banks). Banks with a non-zero D-SIB buffer and banks with too big to fail status are often treated as two identical groups in the media as well.

If we accept this thinking, however, the D-SIB buffer regime may ultimately be counter-productive: it may exacerbate the problem of moral hazard linked with too big to fail status. So if a regulator is of the view that the D-SIB scores it has calculated and the D-SIB buffers it has set do not in themselves preordain a public bank bail-out, it should emphasise this fact in its external communications on D-SIB buffers. At the same time, it is clearly also necessary to suppress too big to fail status directly by putting in place mechanisms (legislation and possibly also resolution plans) that will allow it to resolve the problems of any bank, where possible with limited impacts on the economy and without significant public spending. The reforms currently going on at national and international level are aimed squarely at bolstering such mechanisms.

8. CONCLUSION

This article proposed a comprehensive approach to calculating the systemic importance of banks in the domestic banking sector (the "D-SIB score") and went on to describe one way of determining the additional capital requirement ("D-SIB surcharge") of a bank on the basis of its systemic importance score. The proposed approach respects the core principles set out in BCBS publications while reflecting the conditions of the Czech banking sector.

We used the proposed approach to calculate specific systemic importance scores for individual Czech banks based on end-2011 data. We then derived additional capital requirements based on the systemic importance of individual banks using historical time series for the past 10 years on the return on risk-weighted assets of banks. The calculation showed that this additional capital requirement should be non-zero for a total of four banks after rounding. The highest rounded requirement was CT1 capital of 4.0% of risk-weighted assets.

However, the presented calculations should be regarded only as an analytical basis for further debate. When deciding on which banks to apply a D-SIB buffer to, and how large the buffer should be, the CNB may take into account indicators and approaches other than those proposed in this article.

Lastly, the article tries to emphasise the difference between the set of banks with a non-zero D-SIB buffer and banks with too big to fail status. A non-zero D-SIB buffer does not necessarily mean that the state intends to bail out the bank concerned if it is in danger of failing, however widespread this simplified view may be in the media and some financial publications.

9. REFERENCES

BCBS (2010): *Calibrating Regulatory Minimum Capital Requirements and Capital Buffers: A Top-Down Approach*, Basel Committee on Banking Supervision, October 2010.

BCBS (2011a): *Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems* (Revision June 2011), Basel Committee on Banking Supervision, June 2011.

BCBS (2011b): *Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement*, Basel Committee on Banking Supervision, November 2011.

BCBS (2012): *A Framework for Dealing with Domestic Systemically Important Banks*, Basel Committee on Banking Supervision, October 2012.

BRÄMER, P., GISCHER, H. (2011): *Domestic Systemically Important Banks: An Indicator-Based Measurement Approach for the Australian Banking System*, FEMM Working Paper No. 3/2012, Otto-von-Guericke University of Magdeburg.

FSB (2011): *Key Attributes of Effective Resolution Regimes for Financial Institutions*, Financial Stability Board, November 2011.

KOMÁRKOVÁ, Z., HAUSENBLAS, V., FRAIT, J. (2012): *How to Identify Systemically Important Financial Institutions*, Financial Stability Report 2011/2012, Czech National Bank, pp. 100–111.

KURITZKES, A., SCHUERMANN, T. (2010): *What We Know, Don't Know and Can't Know About Bank Risk: A View from the Trenches*, chapter 6 in Diebold, F. X., Doherty, N. A., Herring, R. J. (eds.): The Known, the Unknown, and the Unknowable in Financial Risk Management: Measurement and Theory Advancing Practice, Princeton University Press.

SEIDLER, J. (2008): *Implied Market Loss Given Default: Structural-Model Approach*, IES Working Paper No. 26/2008.