Modelling interconnection between provision under IFRS9 and countercyclical capital buffer

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Abstract: Impairment recognition according to the International Financial and Reporting Standards changed significantly in 2018 with the introduction of IFRS 9. In this paper I am modelling the interconnection between provision under the new IFRS 9 standard and countercyclical capital buffer of prudential regulation. The recently introduced IFRS 9 impairment model is closely related to the economic cycle. I am modelling the effect of macro environment to the allowance and going to compare it with regulatory mechanism of countercyclical capital buffer.

Keywords: model, impairment, IFRS 9, economic cycle, countercyclical buffer

1 Introduction

In the last few decades, significant changes appeared in the field of financial regulation. Some of them are related to the increasing complexity and volume of financial deals and exposures, and interdependencies between different sectors and entities. Others are consequences of the last big financial crisis, which generated a regulatory dumping all over the world. The sweeping changes of financial infrastructure have remarkable effects to the "real" economy as well. Great parts of the most relevant developments are connected to the reserving capability and reserves of the banks both from prudential - solvency capital - and accounting - allowance - sides. Of course, there should be relevant and significant differences between the prudential and accounting regulations (Borio and Tsatsaronis 2005).

The update of the International Financial and Reporting Standards (IFRS) is one of the main improvements at international level. Inside IFRS the biggest impact might be caused by the IFRS 9 for financial sector, the new standard related to the classification, measurement and accounting of financial instruments.

2 Scope of the paper

In my current paper I am examining the effect of the IFRS 9 standard's impairment model effective from 2018. I am comparing the results with the old standard of IAS 39. Finally, I am looking at the interconnection between countercyclical buffer and IFRS 9 impairment amount within macroeconomic circle.

The explanation and justification behind the revision of the IAS 39 impairment models was that the old accounting standard recognized the credit loss with delay and less in amount as it is needed.

According to these I am examining two hypothesises, one is related to the timing and one is related to the amount of allowance recognition. The first hypothesis is whether the IFRS 9 will recognise the impairment loss earlier and the second hypothesis is that the IFRS 9 will recognise higher impairment amount compared to IAS 39.

Old IAS 39 standard is based on incurred loss model (Tardos 2005, Szabo 2005), which means that only already "incurred" loss could be taken into account in impairment calculation, while according to the new standard there is an expected loss model (IASB 2014). It means that future losses based on expectations about past or current circumstances - with forward looking - should be included as well. This change is intended to resolve the timeliness issue of the former standard. The shortfall of the impairment amount is resolved with the requirement referred as 'staging rules'. Staging rules mean that when there is a significant change in credit risk after initial recognition of the financial assets, than the entity should calculate the expected credit loss for the full lifetime of the instrument instead of for only 12 months.

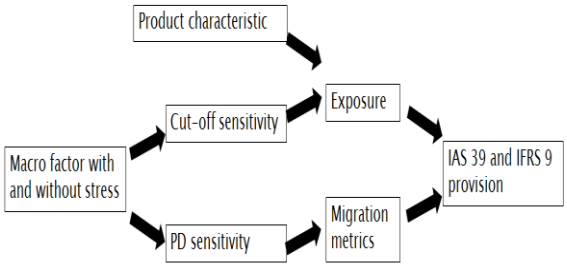
Definition of significant credit risk increase after initial recognition includes qualitative and quantitative criteria as well. Qualitative criteria consist of day past due, work-out, forbearance and early warning indicators, while quantitative criteria are connected to the rating systems as change of rating grade and probability of default since initial recognition (Chawla et al. 2016).

In that sense the macroeconomic circumstances are getting an important role in IFRS 9 through the comparison of initial and current credit risk expectations, which could be the driver of impairment as a systematic factor. As generally there is a big uncertainty in the estimation of macro circumstances, it is worth to analyse the effect of a macro shock to the impairment amount.

Finally, I am examining the IFRS 9 with the interaction of Basel III prudential rules especially with countercyclical capital buffer and aiming to highlight the combined effects of the prudential and accounting rules (Novotny-Farkas 2016).

3 Modelling the process of impairment

In this part, I am investigating the effects of the new impairment model on a hypotatic portfolio with characteristics - based on reasonable judgement - described in chapter 3.1 *Exogenous variables*. The modelling process is depicted by the following diagram:



Picture 1 Modelling process

This modelling process is a deterministic calculation. The outcome of the model is the amount of provision according to IAS 39 and IFRS 9 for sequence of periods with different macroeconomic status. The final provision of a given period is determined by the current and future exposure of the deals in the portfolio multiplied with loss given default and default probabilities coming from migration matrix (see details later in Table 4). Quantity of accepted deals is given by the cut-off sensitivity of the financial entity. Cut-off sensitivity is determined by the macro factor. Product characteristics and migration matrix are influenced by the macro factors as well. It is worth to note that the cut-off sensitivity is not a crucial part of the sub-model, so the conclusions will not change, if it is ignored from the model.

3.1 Exogenous variables

Before showing the steps of the calculation process, I am introducing the exogenous variables and the simplifications used in the model.

Exogenous variables and related simplifications are the following:

- Unconditional probability – so where macroeconomic circumstances are still not incorporated - is constant at 10% for all rating grades.
- Unconditional acceptation rate is constant 80%, rejection rate is 20%.
- Loss given default (LGD): loss recognized after default. Constant value of 10% is used.

- Amortisation of deals' exposure (principal balance): linearly up to the maturity. Default maturity is 5 years. It means, that the exposure of the given deal is 100, 80, 60, 40, 20 in the upcoming years after draw down.
- Applicant: quantity of potential applicants is constant at 100.
- Migration matrix (M0,1): in the calculation the following cumulative unconditional migration matrix is used:

Table 1 Migration matrix

t0->t1	Rating A	Rating B	Default
Rating A	0,7	0,9	1
Rating B	0,2	0,9	1
Default	0	0	1

It means that there are only two non-default rating grades and one default category. Cumulative values mean that the migration probabilities are cumulated from the first value in each rows. To exclude the effect of different rating grades, I am setting the direct default probability to the same level, which is 0,1 as 1 minus 0,9.

- Staging rules: At initial recognition all of the exposures are in rating A. During modelling I will use a simplified staging criteria, namely if the exposure migrated from rating A to rating B, then the exposure will be in stage 2 and lifetime expected loss has to be calculated instead of 12 months' one.
- Macro factor: As a systematic factor, it is the state of the economy in the given year. One baseline and one stress scenario is used during modelling with the following standard normally distributed variables:

Table 2 Scenarios

Time period in year	1-9 period	10	11	12	13	14	15-20 period
Baseline scenario	1	1	1	1	1	1	1
Stress scenario	1	-1	-1	-1	0,5	0,5	1

The economic environment in case of the baseline scenario is a constant mild expansion. 1 is the value of the standard normal distribution meaning the 85th percentile of the possible outcomes. After the 9th period there is a shock in the stress scenario, where the -1 means the 15th percentile of the possible outcomes. After the 12th period the state of the economy starts to converge to the baseline scenario.

- The cut-off sensitivity (acceptance rate of applicants as a new debtor) is set to 10% and migration matrix – so PD – sensitivity is set to 10%. During the modelling process, the change of the sensitivity does not modify the final results.

3.2 Endogenous variables

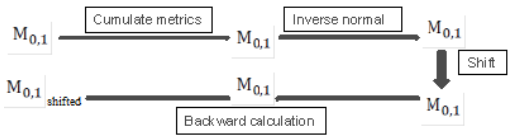
As described above, the major interactions are between PD and macro factors, and between acceptation rate and macro factors.

For the dependency of the PD and the acceptation rate Vasicek formula (1) is used:

$$p_A(X) = \Phi\left(\frac{\Phi^{-1}(\bar{p}_A) - \sqrt{\rho_A}X}{\sqrt{1-\rho_A}}\right). \tag{1}$$

The X is the macro factor with standard normal distribution and the p_A is the correlation between macroeconomic factor and unconditional PD, and between macroeconomic factor and acceptation rate. $P_A(X)$ refers to the conditional PD. Acceptation rate is calculated on the same way as conditional PD, but with different correlation factor to the systematic macro factor (Janecsko 2004).

If the conditional PD value has been already calculated – as defined above -, it can be used to adjust the unconditional migration matrix to get the conditional migration matrix of the given year. The adjustment process of the unconditional migration matrix with conditional PD values (2) looks like the following (named as z-shift adjustment):



(2)

Where $M_{0,1}$ is the unconditional migration matrix (Table 3):

Table 3 Structure of the migration matrix

$$M_{0,1} = \begin{pmatrix} m_{1,1} & m_{1,2} & \cdots & m_{1,d} \\ m_{2,1} & m_{2,2} & \cdots & m_{2,d} \\ \vdots & & \cdots & \\ m_{d-1,1} & m_{d-1,2} & \cdots & m_{d-1,d} \\ 0 & 0 & \cdots & 1 \end{pmatrix}$$

If the conditional migration matrix - adjusted with the conditional PD value - is given for all years, then the value of the exposures in year t after initial recognition (4) can be calculated as (Gruenberger 2012):

$$M_{0,t} = M_{0,1} \cdot M_{1,2} \cdot \cdots \cdot M_{t-1,t} \tag{4}$$

Having this result, the given exposure can be classified into rating A, rating B or in default categories. In case of non-default rating grades, the impairment under IAS 39 is calculated based on the loss of the previous year. Under IFRS 9, if the exposure is in rating A, then according to my assumption, impairment has to be calculated in line with the next 12 months' expected credit loss. If the exposure is in rating B, impairment has to be calculated for the whole lifetime (Volarevic et al. 2018). In case of default, I suppose that the exposure will be written down to the appropriate recovery rate (1-LGD) under both standards.

Based on this deduction, impairment formulas look like the followings:

Table 4 Calculation types

Type of impairment calculation	Calculation formula
IAS 39 Incurred loss	LGD * conditional(t-1)PD * Exposure
IFRS 9 (stage 1) 12 months' expected credit loss	LGD * conditional(t)PD * Exposure
IFRS 9 (stage 2) Lifetime expected credit loss	∑LGD * conditional(t)PD(t) * Exposure(t), where t goes from the current year up to the final maturity of the deal
IFRS 9 expected credit loss	IFRS 9 (stage 1) 12 months' expected credit loss + IFRS 9 (stage 2) Lifetime expected credit loss

4 Results of the impairment model

After the calculation with the model introduced in section 3. *Modelling the process of impairment*, the expected results have been reached. According to this, the allowance values in IAS 39 are less than in IFRS 9. In case of economic changes, the velocity of impairment correction in IAS 39 lags behind that in IFRS 9. So it seems that both hypothesises are proved to be true.

If the IAS 39 and IFRS 9 requirements are compared without staging rule – when all the exposures remain in stage 1 -, then the IAS 39's values lag behind the IFRS 9 ones. As depicted in Figure 1, the impairment rate – impairment divided by exposure – under IAS 39 starts to increase later at the beginning of the recession and starts to decrease later at the end of the recession compared to IFRS 9. At the beginning it is problematic, because the loan loss provision appears later in the

profit and loss statement, and maybe it is resulting that the lending activity is not moderated in time. This characteristic is illustrated with the higher blue line (IAS 39) compared to the purple line (IFRS 9 all exposures in stage 1) in period 11. At the end of recession, there might be a reverse effect to the lending activity, because higher provision values appear in the profit and loss statement reducing the bank's willingness to offer loans.

The effect of the increase in amount could be revealed, if the red line (IFRS 9) is compared to the purple line (IFRS 9 all exposures in stage 1). The variance is caused by the staging criteria.

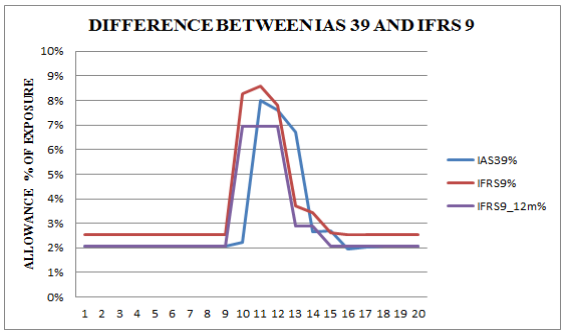


Figure 1 Impairment in IAS 39 and IFRS 9

After comparing the results of IAS 39 and IFRS 9 impairment calculations in different economic circumstances, it is worth to examine their reactions to unexpected macroeconomic changes.

To calculate it, I will run the model with a baseline and a stress scenario of macroeconomic factor detailed in Table 2. Because of the fact that the IAS 39 impairment includes only the incurred losses, such scenarios cause no difference in expected and actual provision values. On the other hand, stress scenario has effect to the IFRS 9 impairment because of the forward looking characteristic of the new standard. Indeed, it is effective only to the deals which are in stage 2 (rating B), where lifetime expected credit loss is calculated. It is illustrated with Figure 2, where red line shows the under-informed and orange line shows the well-informed case regarding the upcoming shock. Orange line is higher in its allowance in period 7, 8 and 9, because in well-informed case the higher lifetime provision of the unexpected shock has been already recognized. It is clear, that the unexpected shock undermines the timeliness effect of the IFRS 9 impairment values.

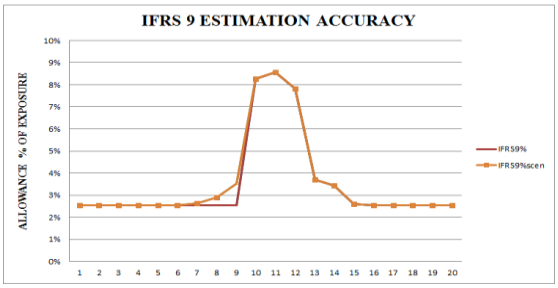
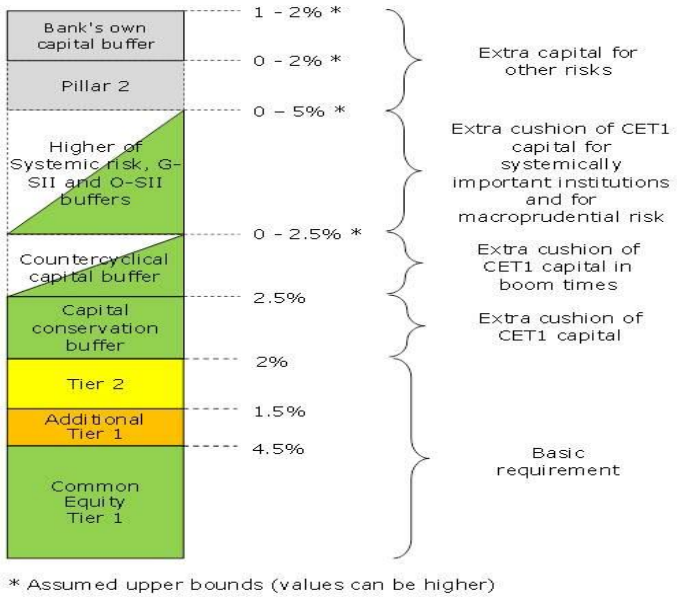


Figure 2 Estimation accuracy

5 Countercyclical buffer under Basel III

The countercyclical buffer is one of the new systematic buffers introduced in Basel III capital regulation. The prescription of that additional capital buffer is in the discretion of local authorities and should be between 0% and 2.5% of the risk weighted asset (Bui et al. 2017). This buffer should be covered with CET1 element of available financial resources.



Picture 2 Capital structure in Basel III

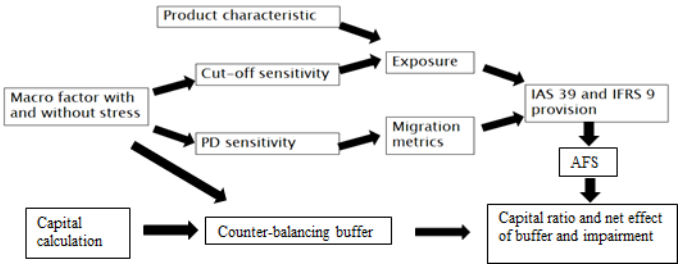
Percentage of the buffer is strictly linked to the macroeconomic cycle. In recession it is close to 0% and in boom it should be 2.5% or near to that rate. Linkage to the

macroeconomic cycle means that the buffer is determined based on the credit-to-GDP ratio's deviation from its long-term trend (Geršl et al. 2015). This is in connection with the forward-looking characteristic of IFRS 9 standard as well, and this could be the starting point of further analysis.

For the current analysis I am simplifying the calculation of the buffer to the macroeconomic indicator, instead of credit-to-GDP ratio.

6 Extension of the model with capital buffer

To investigate the combined effect of countercyclical buffer and IFRS 9 impairment method, the previously used model has to be extended with capital calculation.



Picture 3 Effects in the extended model

According to that, I will calculate the capital requirement based on the internal rating model (IRB). For the calculation, I will use the unconditional PD, LGD parameters and portfolio exposure. After that, the available financial resources (AFS) and the countercyclical capacity can be determined. The value of available financial resources is calculated as a sum of the AFS of the previous period and expected shortfall. Expected shortfall is the maximum of zero and impairment amount minus expected loss of capital calculation. Countercyclical buffer is simply a discrete function of macro variable. So for example, if normal distribution value of macro variable is between 0 and 0.25, then capital buffer is 0; if between 0.25 and 0.5, then capital buffer is 1 etc. Finally, I calculate the available financial resources equivalent effect of countercyclical buffer and impairment amount. The last one is indeed the expected shortfall itself.

7 Final results

After the calculation with the extended model, the conclusion is that in recession the total effect of these prudential and accounting regulation changes are ceteris paribus anti-cyclical. As it is depicted on Figure 3, if there are worsening macro conditions (red line), then the equivalent of additional effect to the available financial resources value (blue line) will be lower. At the end of the recession, the increase of this additional effect is lagging behind the macroeconomic conditions.

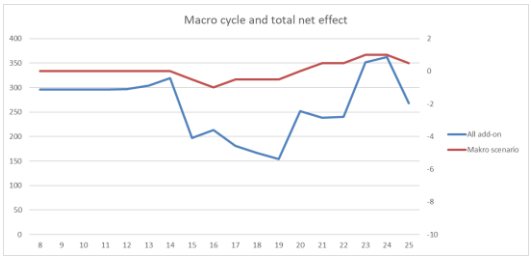


Figure 3 Total effect of net changes in cycle

Digging into the details, it is to be recognized that the countercyclical buffer compensates the increasing impairment amount. The impairment amount is increasing during the recession due to expected shortfall. This is in line with the true and fair presentation of the situation. On the other hand, the countercyclical buffer could compensate the cyclical effect caused by the accounting regulation.

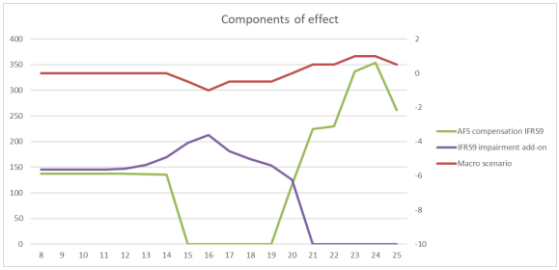


Figure 4 Components of effect

Conclusions

This paper has provided, on one hand, an analysis between the impairment requirements of the old IAS 39 and the new IFRS 9 standards, and, on the other hand, an examination of combined effect of the IFRS 9 impairment amount and countercyclical buffer. At the previous case, the focus was on the two main dimensions of impairment recognition, namely time and amount. I set up one hypothesis for each of the dimensions. I got the result that in my examination the hypotheses are true, so IFRS 9 recognises loan loss provision earlier and with higher amount than IAS 39. It is also shown that the timeliness of the provision is

demolished, if there is an unexpected shock or uncertainty in the economic circumstances. Finally, a typical case of connection between accounting and prudential regulation has been shown, where negative prudential effect of accounting rule (impairment recognition) is compensated by prudential regulation (countercyclical capital buffer).

It is clear that further research is necessary to highlight the detailed, combined effect of the IFRS 9's impairment method and the countercyclical capital buffer, and in a wider scope the interconnection between accounting and prudential regulation, and their effects to the financial sector and to the economy. Some of the issues have already been discussed in (Wezel et al. 2012, De Lis et al 2013), where dynamic provisioning is analysed as an expected credit loss based method, or in (Gruenberger 2012), where capital requirement was incorporated as well.

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