Banks' Capital Surplus and the Effect of Additional Capital Requirements

CNB WP 8/2017

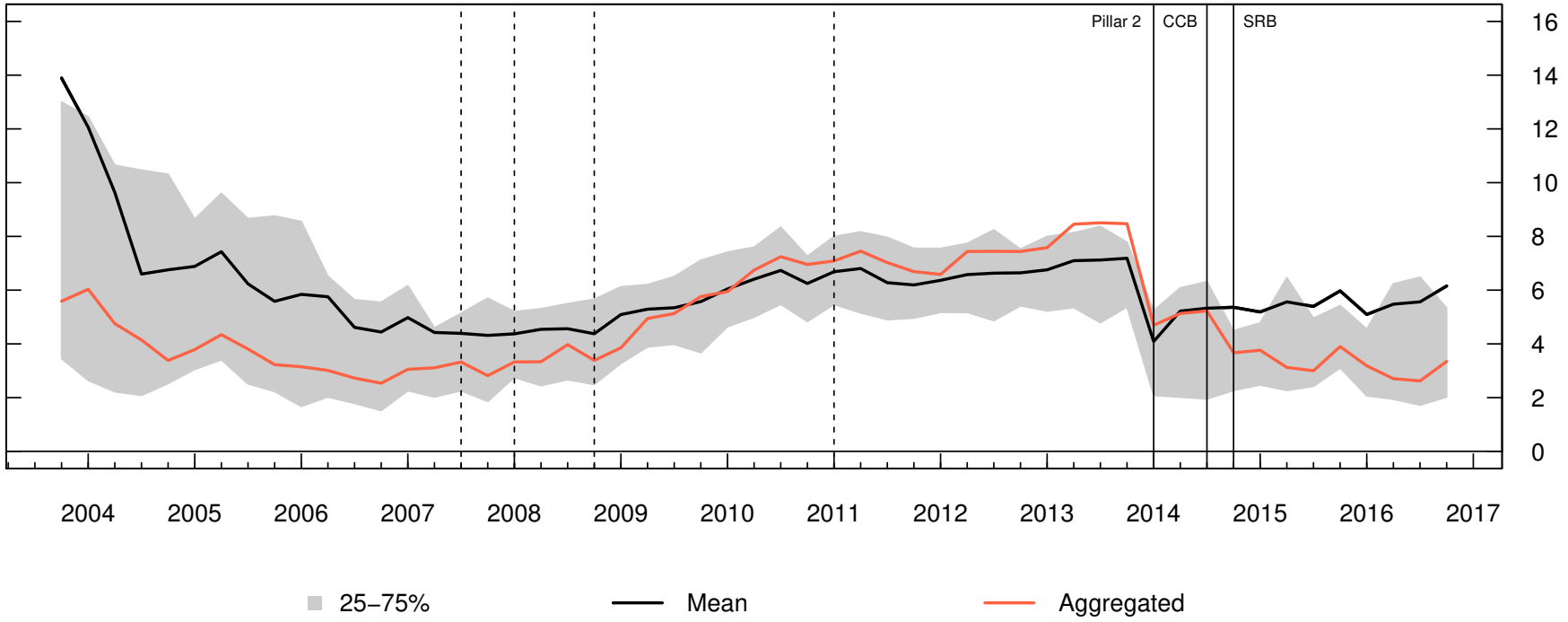
Simona Malovaná

CNB Research Open Day, May 21, 2018

The author notes that the presentation represents her own views and not necessarily those of the Czech National Bank.

Motivation (1)

Capital surplus
(total regulatory capital in excess of overall capital requirements; % of risk-weighted exposures)



Note: Overall capital requirements – Pillar 1 + additional Pillar 2 + combined buffer requirement. Dashed vertical lines – switches to internal ratings-based approach (5 banks/bank groups in 4 waves); solid vertical lines – additional capital requirements stemming from capital buffers (capital conservation buffer, CCB, and systemic risk buffer, SRB) and Pillar 2 add-ons.

Motivation (2)

- Intentional vs unintentional (targeted vs non-targeted) capital surplus → different policy implications
  - Intentional CS – hedging against having to raise new equity on short notice; planned future asset expansion or change in the asset structure; expected increase of additional capital requirements; risk aversion etc.
  - Unintentional CS – sticky dividend payments & long run accumulation of high earnings

- The paper has two main purposes:
  - to estimate individual bank-specific capital targets and distinguish between intentionally and unintentionally formed capital surpluses, and
  - to analyse the impact of additional capital requirements stemming from capital buffers and Pillar 2 add-ons on banks' intentional capital surplus and total regulatory capital ratio.

Partial adjustment model (1)

Literature: Hancock & Wilcox (1994); Berger *et al.* (2008); Flannery & Rangan (2008); Francis & Osborne (2009); Lemmon *et al.* (2008); Berrospide & Edge (2010); Gropp & Heider (2010)

$$CAR^*_{i,t} = \theta X_{i,t}$$
$$CAR_{i,t} - DNCAR_{i,t} = \lambda(CAR^*_{i,t} - DNCAR_{i,t}) + \epsilon_{i,t}$$
$$CAR_{i,t} = (1-\lambda)DNCAR_{i,t} + \lambda\theta X_{i,t} + \epsilon_{i,t} + \upsilon_i$$

where $CAR^*_{i,t}$ is target capital ratio, $X_{i,t}$ is vector of control variables, $DNCAR_{i,t} = (capital_{i,t-4} + NP_{i,t} - DIV_{i,t-4})/RWE_{i,t-4}$ is "do-nothing capital ratio", $NP_{i,t}$ is annual net profit, $DIV_{i,t}$ are average annual dividend payments, $RWE_{i,t}$ are risk-weighted exposures, λ is a annual speed of adjustment and υ_i are bank-level fixed effects.

Control variables ($X_{i,t}$): ROA, LLPA, log(A), different loan categories to total assets (mortgage loans, other retail loans, corporate loans), real GDP growth, VIX, three dummy variables – crisis, IRB and regulatory pressures.

Slight modification: $DNCAR_{i,t} = (capital_{i,t-4} + NP_{i,t} - DIV_{i,t-4})/RWE_{i,t}$
where λ is speed of adjustment of capital given current level of risk-weighted exposures.

Partial adjustment model (2)

- Speed of adjustment might depend on the actual capital position of the bank (Berger *et al.* , 2008)
  - Banks with capital ratios below their desired target may adjust more quickly than banks with capital ratios above the target.
  - Banks far below targets and close to regulatory requirements may be subjected to extra pressure from regulators and investors to increase capital even more rapidly.

$$CAR_{i,t} = \left[(1-\lambda_1) + (1-\lambda_2) dCAR25_{i,t}\right] DNCAR_{i,t} + \theta_1 X_{i,t} + \epsilon_{i,t} + \upsilon_{1,i}$$
$$CAR_{i,t} = \left[(1-\lambda_3) + (1-\lambda_4) dCAR75_{i,t}\right] DNCAR_{i,t} + \theta_2 X_{i,t} + \epsilon_{i,t} + \upsilon_{2,i}$$

where $dCAR25_{i,t}$ ($dCAR75_{i,t}$) is dummy for lower (upper) quartile of total regulatory capital ratio.

Effect of additional capital requirements

Baseline:

$$ICS_{i,t} = \alpha_1 ICS_{i,t-1} + \beta_1 OCR_{i,t-1} + \theta_1 X_{i,t-1} + \epsilon_{1,i,t}$$
$$CAR_{i,t} = \alpha_2 CAR_{i,t-1} + \beta_2 OCR_{i,t-1} + \theta_2 X_{i,t-1} + \epsilon_{2,i,t}$$

where $ICS_{i,t}$ is the intentional capital surplus (the difference between the target capital ratio and the overall capital requirement) and $OCR_{i,t}$ is the overall capital requirement.

Numerator vs denominator:

$$ICSnrw_{i,t} = \alpha_3 ICSnrw_{i,t-1} + \beta_3 OCR_{i,t-1} + \omega_1 RW_{i,t} + \theta_3 X_{i,t-1} + \epsilon_{3,i,t}$$
$$CA_{i,t} = \alpha_4 CA_{i,t-1} + \beta_4 OCR_{i,t-1} + \omega_2 RW_{i,t} + \theta_4 X_{i,t-1} + \epsilon_{4,i,t}$$
$$RW_{i,t} = \alpha_5 RW_{i,t-1} + \beta_5 OCR_{i,t-1} + \omega_3 CA_{i,t} + \theta_5 X_{i,t-1} + \epsilon_{5,i,t}$$

where $ICSnrw_{i,t}$ is a *non-risk-weighted* version of $ICS_{i,t}$, $RW_{i,t}$ is implicit risk weight and $CA_{i,t}$ is total regulatory capital over total assets. Additional controls – $CA_{i,t}$ and $RW_{i,t}$.

Estimation techniques:

- Standard LSDV estimator; R package *plm*.
- Bootstrap bias-corrected LSDV estimator; Stata routine *xtbcfe*.

Data

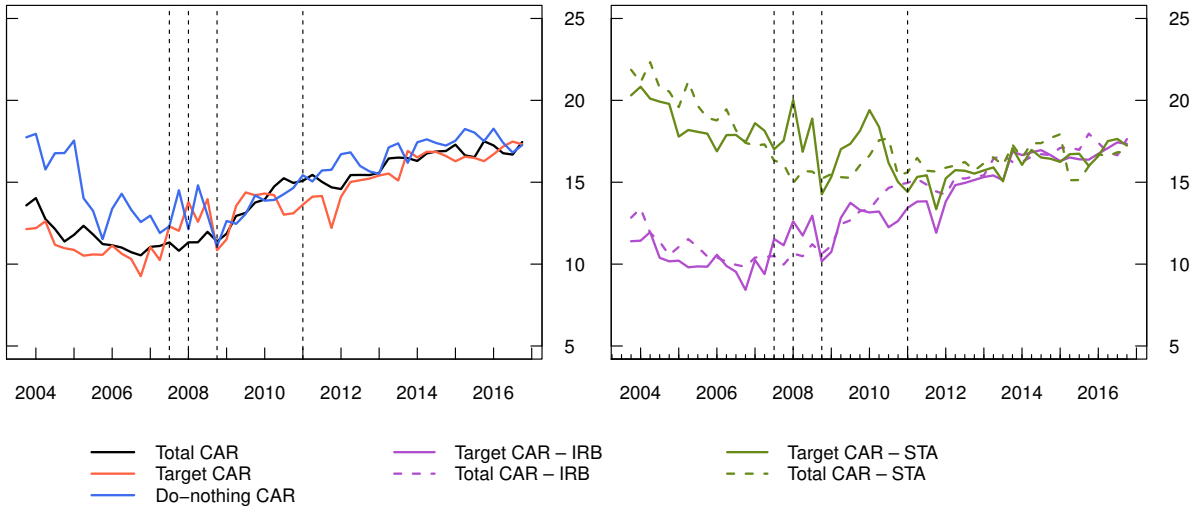
- Supervisory bank-level data (the Czech Export Bank, the Czech-Moravian Guarantee and Development Bank and ERB excluded)
- Consolidated statements (robustness check on solo basis)
- 2002 Q4 to 2016 Q4 (57 quarters), 14 banks/bank groups $\rightarrow$ 622 observations (unbalanced panel)
- Total regulatory capital ratio adjusted for outliers – unreliably high values of a few smaller banks at the first quarters after they entered the market
- + other data adjustments advised by CNB supervisors; the robustness to all adjustments checked

Results – target (1)

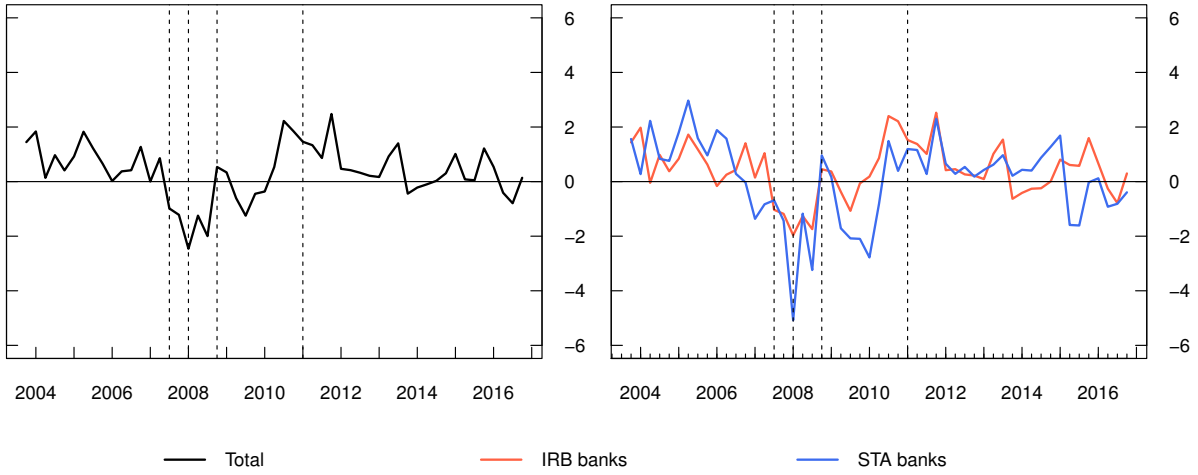
Denominator of do-nothing CAR:	Lagged RWE				Current RWE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Do-nothing CAR	0.340***	0.326***	0.307***	0.092**	0.667***	0.655***	0.398***
	(0.021)	(0.021)	(0.021)	(0.044)	(0.033)	(0.034)	(0.063
Do-nothing CAR*dCAR25			-0.279**			-0.479***	
			(0.139)			(0.137)	
Do-nothing CAR*dCAR75				0.216***			0.250***
				(0.049)			(0.078)
ROA (t-1)	0.608***	0.666***	0.577***	0.528***	0.363**	0.317*	0.315*
	(0.202)	(0.200)	(0.195)	(0.184)	(0.183)	(0.179)	(0.177)
Log(assets) (t-1)	-0.093	-0.707*	-0.935**	-0.465	-1.687***	-1.747***	-1.325***
	(0.364)	(0.395)	(0.385)	(0.364)	(0.344)	(0.337)	(0.340)
Loan loss provisions/assets (t-1)	-0.211	-0.155	-0.371*	-0.043	-0.758***	-0.888***	-0.583***
	(0.207)	(0.207)	(0.207)	(0.191)	(0.190)	(0.188)	(0.185)
Regulatory pressures	-2.178***	-2.155***	-1.683**	-2.010***	-1.379*	-1.396*	-1.543**
	(0.824)	(0.810)	(0.813)	(0.746)	(0.741)	(0.748)	(0.719)
Mortgage loans/assets (t-1)		0.139***	0.080**	0.082**	0.095***	0.051	0.078**
		(0.038)	(0.039)	(0.036)	(0.035)	(0.035)	(0.035)
Other retail loans/assets (t-1)		-0.304***	-0.232***	-0.241***	-0.223***	-0.150**	-0.204***
		(0.067)	(0.067)	(0.063)	(0.062)	(0.061)	(0.060)
Corporate loans/assets (t-1)		-0.039**	-0.031**	-0.030**	-0.014	-0.010	-0.015
		(0.016)	(0.016)	(0.015)	(0.015)	(0.014)	(0.014)
IRB	3.020***	2.597***	1.843***	2.241***	2.211***	1.665***	2.066***
	(0.601)	(0.638)	(0.633)	(0.586)	(0.582)	(0.575)	(0.562)
VIX	-0.058**	-0.046*	-0.038	-0.043**	-0.027	-0.020	-0.032
	(0.024)	(0.024)	(0.023)	(0.022)	(0.022)	(0.021)	(0.021)
Crisis	-1.816***	-1.416***	-1.302***	-0.753	-1.010**	-0.978**	-0.487
	(0.514)	(0.513)	(0.499)	(0.475)	(0.469)	(0.457)	(0.459)
Real GDP growth	-0.233***	-0.145*	-0.128	-0.149*	-0.088	-0.084	-0.106
	(0.086)	(0.086)	(0.084)	(0.079)	(0.079)	(0.077)	(0.076)
dCAR25			0.650			3.049**	
			(1.818)			(1.546)	
dCAR75				0.829			-0.986
				(0.945)			(1.301)
Adjusted R^2	0.396	0.420	0.454	0.513	0.518	0.543	0.553
Speed of adjustment $(1-\lambda)$:							
– Total	66%	67%			33%		
– 1st quartile			97%			82%	
– 4th quartile				69%			60%

Results – target (2)

(a) Total Regulatory and Target Capital Ratio (%)



(b) Aggregated Difference between Total Regulatory and Target Capital Ratio (”Unintentional Capital Surplus”; %)



Results – additional capital requirements

Dependent variable:	CAR (1)	ICS (2)	CA (3)	ICSnrw (4)	RW (5)
Dependent variable (t-1)	0.839***	0.061	0.682***	0.044	0.603***
	(23.84)	(1.06)	(10.34)	(0.71)	(6.85)
Overall capital requirements (t-1)	0.096***	-0.762***	0.079***	-0.394***	-0.550**
	(3.78)	(-12.16)	(3.53)	(-6.09)	(-2.51)
ROA (t-1)	0.132	1.052***	-0.0751	1.170***	-0.277
	(0.70)	(3.98)	(-0.65)	(5.60)	(-0.46)
Log(assets) (t-1)	0.154	-0.997**	-0.102	-0.614	-2.005
	(0.45)	(-2.42)	(-0.52)	(-1.45)	(-0.68)
Loan loss provisions/assets (t-1)	0.104	-0.152	0.336**	-0.052	-3.249**
	(0.55)	(-0.49)	(2.47)	(-0.24)	(-2.41)
Mortgage loans/assets (t-1)	0.017	0.168***	0.014	0.062	0.064
	(0.56)	(3.81)	(0.49)	(1.36)	(0.41)
Other retail loans/assets (t-1)	-0.078**	-0.256***	-0.119*	-0.107	0.685**
	(-2.05)	(-3.11)	(-1.77)	(-1.64)	(2.41)
Corporate loans/assets (t-1)	0.016	-0.029	-0.028	-0.005	0.126
	(0.65)	(-1.21)	(-0.94)	(-0.22)	(1.16)
IRB	0.370	3.453***	0.489	2.130***	-2.657*
	(1.46)	(10.16)	(1.30)	(4.93)	(-1.74)
VIX	0.000	-0.071***	-0.005	-0.047***	0.000
	(-0.03)	(-10.74)	(-1.01)	(-5.41)	(0.02)
Crisis	0.175	-1.185***	0.180	-0.782***	-1.587
	(0.68)	(-6.22)	(0.70)	(-4.05)	(-0.86)
Real GDP growth	-0.014	-0.214***	-0.011	-0.140***	0.036
	(-0.59)	(-9.04)	(-0.35)	(-5.12)	(0.22)
CA					1.737***
					(3.21)
RW			0.071***	0.037*	
			(3.33)	(1.93)	
Observations	363	363	363	363	363

- In response to 1 pp increase in overall capital requirements
  - the intentional capital surplus shrinks by 0.8 pp (banks reassess their targets upwards by 0.2 pp),
  - the total regulatory capital ratio increases by 0.1 pp (due to small intentional surplus).
- The impact on the non-risk-weighted CS is of the same direction but the strength shrinks to roughly 50%
- The impact on risk weights is strong and negative.
- The adjustment of risk weights seems to play an important role in transmission of additional capital requirements.

Conclusions and discussion

- Czech banks cannot be regarded as either active or passive managers of their capital.
  - The overall speed of adjustment (67%) seems to be rather high and above average values reported in the literature.
  - The contribution of adjustment in the level of capital is about half which is a below-average value; the other half is delivered through changes in risk-weighted exposures (through a combination of changes in portfolio size, structure and risk).
- Incomplete pass-through from higher additional capital requirements to banks' intentional capital surplus and total regulatory capital ratio.
- A substantial portion of the change seems to be delivered through the change in risk weights.
  - Banks may adjust risk weights through a combination of changes in the asset structure and risk estimates (under IRB approach); beyond the scope of this paper to distinguish between these effects.

THANK YOU FOR YOUR ATTENTION

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Regulatory capital and RWE