The impact of Basel III implementation on bank lending in South Africa

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Introduction

- This paper investigates the impact of the higher regulatory capital requirements of the implementation of the Basel III in South Africa between 2013 and 2019.
- The principal data employed is monthly balance sheet data
- Focus on a small set of large banks has some advantages: business models of these banks are similar
- Our empirical specification follows previous studies of the impact of capital requirements on bank credit supply (for UK Aiyar *et al.* (2014); for Peru Fang *et al.* (2020))
- We find report smaller coefficient estimates than in these previous studies or (for capital buffers) in Pillay and Makrelov (2023)

Literature

- Earlier studies did not directly study the impact of regulation on bank credit
- However, found some significant effects of increased capital ratios on lending (Peek and Rosengren, 1997; Houston, James and Marcus, 1997) - subsidiary effect
- Some studies focus on bank which are close to the regulatory capital (Berger and Udell, 1994; Nier and Zicchino, 2005; Van den Heuvel, 2008)
- More recently, there has been a sharper focus on regulation impact on bank lending
- Francis and Osborne (2012) showed that a decline in the capital buffer resulted in risk weighted assets
- Aiyar *et al.* (2014) and Aiyar, Calomiris and Wieladek (2016) also found a decline in bank lending in the UK which used trigger ratios
- Limited studies in emerging markets
- The best study was in Peru by Fang *et al.* (2020)

A closer look at two related papers

- Aiyar et. al. (2014):
  - Minimum capital $\uparrow$ 1%, lending , $\downarrow \approx$ 8%
  - changes in requirements not (fully) anticipated
  - no time fixed effects
- Fang et. al. (2022)
  - Minimum capital $\uparrow$ 1%, lending , $\downarrow \approx$ 4%
  - changes in requirements clearly flagged in advance
  - includes time fixed effects

Aiyar *et al.* (2014)

TABLE 4

THE EFFECT OF CHANGES IN BANK MINIMUM CAPITAL REQUIREMENTS ON REGULATED BANK LENDING GROWTH

Dependent variable: Real regulated bank lending growth	1	2	3	4	5	6
DBBKR	−0.073**	−0.08***	−0.078***	−0.076***	−0.075***	−0.057***
(Prob > F)	0.0121	0.00554	0.00148	0.00114	0.00125	0.00174
Demand		0.02**	0.025**	0.028**	0.028**	0.023
(Prob > F)		0.0461	0.0433	0.0237	0.0261	0.134
GDP growth			0.057*	0.061*	0.061*	0.053
(Prob > F)			0.0860	0.0640	0.0642	0.140
Inflation			0.00872	0.00674	0.00659	−0.00197
(Prob > F)			0.669	0.741	0.746	0.932
Lags of Write-offs					−0.00593	
(Prob > F)					0.586	
Leads of Write-offs						0.0269**
(Prob > F)						0.0381
TIER1				0.000605	0.000615	0.000654
				(0.000592)	(0.000591)	(0.000613)
BIG				0.0230	0.0232	0.0124
				(0.0182)	(0.0182)	(0.0250)
RISK				0.00106	0.00107	0.00143*
				(0.000794)	(0.000791)	(0.000742)
SUB				0.0219	0.0219	0.0451***
				(0.0173)	(0.0173)	(0.0125)
Constant	0.00991	0.00488	−0.0415	−0.150**	−0.148**	−0.157**
	(0.00702)	(0.00851)	(0.0365)	(0.0724)	(0.0721)	(0.0652)
Observations	1,815	1,815	1,815	1,814	1,814	1,564
Number of banks	82	82	82	82	82	72

Fang *et al.* (2020)

Table 2
Baseline results. *Notes*: The table presents OLS estimates of model (1). The dependent variable is loan growth difference between $t+r$ and $t-s$. All control variables are defined in Table 1. Weighted regressions use total at the bank level, are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| Dep. Var.: $\Delta LOAN_{t+r,t-s}$ | (1) | (2) | (3) | (4) | (5) | (
| $(r, s) =$ | (0,1) | (0,1) | (1,1) | (2,2) | (0,1) | (
| $\Delta KR_{t,t-1}$ | −0.0446*** | −0.0410*** | −0.0125 | 0.0262 | −0.0576*** | −
| | (0.010) | (0.013) | (0.028) | (0.045) | (0.013) | (
| $CAR - KR_{t-s}$ | | −0.1477 | 0.0666 | 0.3128 | | 0
| | | (0.135) | (0.296) | (0.548) | | (
| Assets_{t-s} | | −0.0828*** | −0.1883*** | −0.3016*** | | −
| | | (0.024) | (0.053) | (0.088) | | (
| ROA_{t-s} | | 0.4971 | 0.6948 | 1.6132 | | 0
| | | (0.983) | (1.851) | (2.260) | | (
| Liquidity_{t-s} | | −0.0016 | 0.0461 | 0.0290 | | 0
| | | (0.061) | (0.073) | (0.152) | | (
| RWA_{t-s} | | −0.0650 | −0.1208 | −0.2489 | | −
| | | (0.046) | (0.086) | (0.161) | | (
| Demand_{t-s} | −0.0101 | −0.0017 | −0.0046 | 0.0032 | −0.0059 | 0
| | (0.034) | (0.032) | (0.026) | (0.023) | (0.066) | (
| Observations | 550 | 550 | 544 | 516 | 550 | 5
| R^2 | 0.332 | 0.415 | 0.485 | 0.516 | 0.543 | 0
| Bank fixed effects | Yes | Yes | Yes | Yes | Yes | Y
| Quarter fixed effects | Yes | Yes | Yes | Yes | Yes | Y
| Weighted regressions | No | No | No | No | Yes | Y

Some reasons to be cautious

- theoretical prior, changes in required bank capital RBC impact lending
  - in SR, but not LR
  - only marginally, even in SR, when
    1. banks are fully capitalised OR
    2. capital increase is flagged well in advance
- Demand variable does not fully address endogeneity
  - Aiyar at al, Minimum capital ↑, a response to unsustainable lending
  - Fang et al, seasonal reallocation of credit

Seasonal reallocation of credit

- Composition bank credit across banks varies seasonally
  - examples: Xmas, agricultural seasons
- May be a bigger concern when
  - Interventions are seasonal, as they are for Basel III
  - Bank customer base varies
  - Focusing on relative growth of bank credit (i.e. including time dummies)
- Corrections?
  - Not corrected by standard demand proxy
  - Statistically impact should reduce using disaggregated loan categories
  - Or possibly correcting for demand using loan margins data

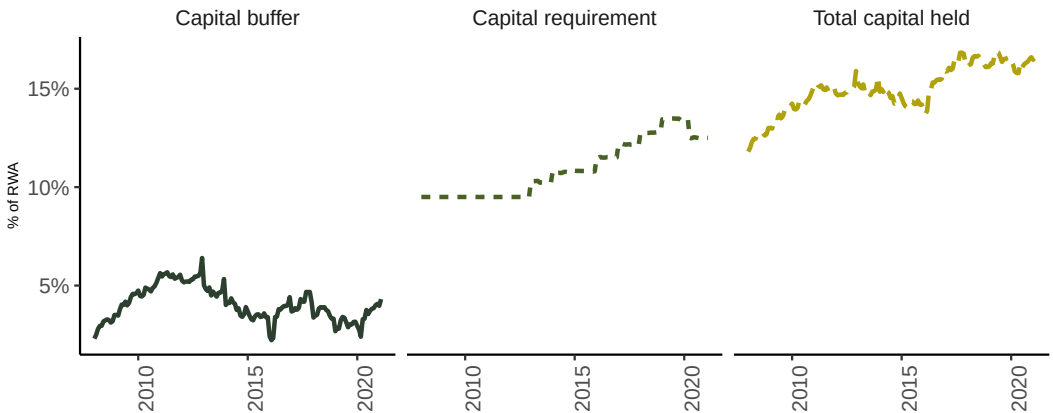
SA banking sector

- There are 34 active licensed banks in South Africa
- As of April, 2020, the % of banking sector assets: Standard Bank of South Africa (24.1%), First Rand (20.4%), ABSA (19.8%), Nedbank (17.0%) and Investec (7.8%); the next largest bank is Capitec (2%)
- The ratio of bank assets to GDP is 112%
- This prudential regulation and South Africa's well-capitalised banking sector has prevented the emergence any systemic financial crisis

Basel III capital framework

Basel III capital requirement structure	
Category	Percent
Basel III minima	8
South African minima	8
Pillar 2A	0.5 to 2
South Africa base minima	8 + Pillar 2A
Pillar 2B (ICR)	no specific range
Prudential minima	8 + Pillar2A + ICR
Systemically important buffer	0.5 to 2.5
Capital conservation buffer	0 to 2.5
Countercyclical buffer	0 to 2.5

Incremental implementation of capital requirments



Data

- We collected data on the four major South African banks: Absa Bank, Standard Bank, First National Bank, and Nedbank
- Mainly utilised the BA900s (bank economic returns) and the BA930s (bank product lending rates)
- The Basel III capital requirements (BA700s) data was collected from the Prudential Authority
- From the Prudential Authority, we also collected the controls data
- We focus on real economic activity lending in the BA900s is represented by lending to households and non-financial corporations.
- However, the BA900s only report granular lending categories to households and non-financial corporations. Therefore, some aggregation was necessary.
- This aggregation essentially limited our sample to the big four lenders
- Three major categories for households and non financial corporations (secured, unsecured, and mortgages)

Methodology

Building on Fang *et al.* (2020):

$$\Delta LOAN^{i}_{t,t-s} = \beta \Delta KR^{i}_{t,t-1} + \lambda \Delta KS^{i}_{t,t-1} + \alpha \Delta Demand^{i}_{t,t-1} + \gamma' \boldsymbol{X}^{i}_{t-s} + \phi^{i} + \tau_t + \varepsilon^{i}_{t}.$$

- ^{i} refers to the four banks
- $\Delta LOAN^{i}_{t,t-s}$ is the log difference of lending
- $\Delta KR^{i}_{t,t-1}$ is the change in the minimum capital requirement
- $\Delta Demand^{i}_{t,t-1}$ is the lending demand proxy represented
- $\boldsymbol{X}^{i}_{t-s}$ is a bank level controls set at month $t-s$.
- The fixed effects (ϕ^{i}) estimate other unobserved differences in bank characteristics.
- To account for other factors, such as changes in the macroeconomic environment, we employ time-fixed effects (τ_t).
- ε^{i}_{t} using bank clustered standard errors

Identification

- However, there are challenges with the identification of $\Delta KR^{i}_{t,t-1}$ (Fang *et al.*, 2020)
- That is, it is not just the changes due to Basel III that are included in $\Delta KR^{i}_{t,t-1}$
- We isolate the Basel III related changes using a dummy structure (1 when there are Basel III related changes, and 0 otherwise)
- This ensures that we are estimating the Basel III impact and not other balance sheet related adjustments
- Furthermore, we use a novel approach in estimating $\Delta Demand^{i}_{t,t-1}$ as compared to Fang *et al.* (2020) and others. However, most studies found demand effects tend to be insignificant

Results I

	Household secured credit				
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	-0.0060***	-0.0062***	-0.0036**	-0.0060***	-0.0031
	(0.0016)	(0.0014)	(0.0017)	(0.0016)	(0.0022)
$\Delta KS_{t,t-1}$		-0.0966	-0.0434	-0.0603	-0.0062
		(0.1297)	(0.1585)	(0.1109)	(0.1161)
$\Delta Demand_{t,t-1}$			0.0038		0.0035
			(0.0037)		(0.0048)
ROA_{t-1}				0.3250	0.2359
				(1.1751)	(1.3343)
ROE_{t-1}				-0.0936	-0.0848
				(0.0987)	(0.1101)
$Liquidity_{t-1}$				-0.0076	-0.0077
				(0.0074)	(0.0081)
Num.Obs.	372	372	369	368	365
Test of equality (p-value)	0.00	0.00	0.08	0.00	0.30
Adj.R squared	0.29	0.29	0.29	0.32	0.31

Note:

The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Results II

	Household unsecured credit				
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	-0.0081***	-0.0087***	-0.0025	-0.0084***	-0.0017
	(0.0017)	(0.0022)	(0.0029)	(0.0017)	(0.0030)
$\Delta KS_{t,t-1}$		-0.2809	-0.1138	-0.2405	-0.0762
		(0.1841)	(0.1996)	(0.1619)	(0.1696)
$\Delta Demand_{t,t-1}$			-0.0035		-0.0042
			(0.0032)		(0.0032)
ROA_{t-1}				1.0548	0.7079
				(1.2607)	(1.1998)
ROE_{t-1}				-0.0920	-0.0731
				(0.1030)	(0.1015)
$Liquidity_{t-1}$				-0.0039	-0.0012
				(0.0071)	(0.0070)
Num.Obs.	372	372	368	368	364
Test of equality (p-value)	0.00	0.00	0.08	0.00	0.83
Adj.R squared	0.38	0.39	0.39	0.36	0.37

Note:

The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Results III

	Household mortgages				
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	-0.0023***	-0.0023***	-0.0023***	-0.0026***	-0.0026***
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
$\Delta KS_{t,t-1}$		-0.0193	-0.0186	-0.0057	-0.0046
		(0.0153)	(0.0161)	(0.0159)	(0.0160)
$\Delta Demand_{t,t-1}$			0.0001		0.0000
			(0.0011)		(0.0009)
ROA_{t-1}				0.4725*	0.4959*
				(0.2692)	(0.2719)
ROE_{t-1}				-0.0396**	-0.0410**
				(0.0176)	(0.0170)
$Liquidity_{t-1}$				0.0026	0.0026
				(0.0021)	(0.0022)
Num.Obs.	372	372	368	368	364
Test of equality (p-value)	0.00	0.00	0.00	0.00	0.00
Adj.R squared	0.59	0.59	0.59	0.63	0.63

Note:

The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Results IV

Non financial corporations secured credit					
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	-0.0100***	-0.0102***	-0.0048*	-0.0096***	-0.0052**
	(0.0018)	(0.0019)	(0.0027)	(0.0021)	(0.0025)
$\Delta KS_{t,t-1}$		-0.0845	0.0538	-0.0145	0.0893
		(0.1095)	(0.1031)	(0.1126)	(0.1223)
$\Delta Demand_{t,t-1}$			0.0040*		0.0106***
			(0.0023)		(0.0022)
ROA_{t-1}				0.3812	0.4672
				(1.1936)	(1.1979)
ROE_{t-1}				-0.0559	-0.0574
				(0.0700)	(0.0688)
$Liquidity_{t-1}$				-0.0160***	-0.0176***
				(0.0027)	(0.0026)
Num.Obs.	372	372	368	368	364
Test of equality (p-value)	0.00	0.00	0.03	0.00	0.00
Adj.R squared	0.25	0.25	0.25	0.28	0.28

Note:

The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Results V

Non financial corporations unsecured credit					
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	0.0034	0.0027	0.0020	0.0067	0.0025
	(0.0085)	(0.0088)	(0.0082)	(0.0112)	(0.0096)
$\Delta KS_{t,t-1}$		-0.3137	-0.3602	0.0630	-0.0476
		(0.6473)	(0.7107)	(0.6036)	(0.6553)
$\Delta Demand_{t,t-1}$			0.0083*		0.0168***
			(0.0046)		(0.0050)
ROA_{t-1}				4.3277***	4.5384***
				(1.4400)	(1.2892)
ROE_{t-1}				-0.2063***	-0.2165**
				(0.0655)	(0.0845)
$Liquidity_{t-1}$				-0.0331***	-0.0384***
				(0.0097)	(0.0091)
Num.Obs.	372	372	364	368	360
Test of equality (p-value)	0.69	0.64	0.33	0.81	0.92
Adj.R squared	0.10	0.10	0.11	0.15	0.16

Note:

The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Results VI

Non financial corporations mortgage credit					
	(1)	(2)	(3)	(4)	(5)
$\Delta KR_{t,t-1}$	0.0022	0.0014	0.0022	0.0005	0.0015
	(0.0026)	(0.0027)	(0.0027)	(0.0027)	(0.0032)
$\Delta KS_{t,t-1}$		-0.3535**	-0.3415**	-0.4139***	-0.4030***
		(0.1407)	(0.1398)	(0.1359)	(0.1434)
$\Delta Demand_{t,t-1}$			-0.0050***		-0.0055***
			(0.0014)		(0.0009)
ROA_{t-1}				1.4596	1.2758
				(2.0032)	(2.1460)
ROE_{t-1}				-0.0947	-0.0819
				(0.1459)	(0.1428)
$Liquidity_{t-1}$				0.0075	0.0081
				(0.0063)	(0.0088)
Num.Obs.	372	372	368	368	364
Test of equality (p-value)	0.43	0.00	0.00	0.00	0.00
Adj.R squared	0.12	0.13	0.13	0.14	0.14

Note:

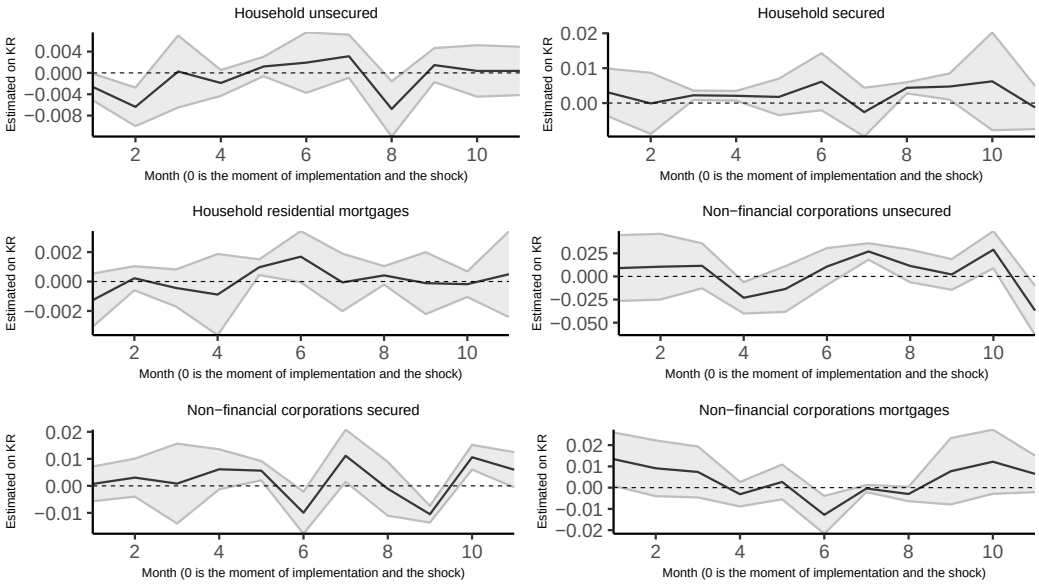
The dependant variables in loan growth at bank level at a monthly frequency, calculated as the log difference at t and t -1.

Standard errors are clustered at a bank level.

All equations include both bank and monthly effects. A test for equality p-value of < 0.1 is significant.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Timevarying estimates via local projections (Jordà, 2005)



Conclusion I

- Our estimates of between 0.48 and 2.4 percentage points are lower than Fang *et al.* (2020) estimates of 4 to 6 percentage points
- However, they are closer to the UK, where Aiyar, Calomiris and Wieladek (2016) found 0.55 percentage points
- The SARB's gradual approach resulted in a comparably lower lending effect
- Although they focus on the impact of the surplus capital buffer on lending in South Africa, in their estimations Pillay and Makrelov (2023) similar magnitudes on the impact of capital requirements on lending.
- The lower estimates are not surprising as the extent of the reduction in lending primarily depends on how expensive it is for banks to raise equity (Aiyar, Calomiris and Wieladek, 2016). South African banks, in addition, to the capital requirements, kept a significant capital buffer.

Conclusion II

- The results also revealed a more significant effect on household lending versus non-financial corporation lending.
- One explanation is that it is much easier for banks to discriminate between borrowers in their commercial business versus retail business when banks need to reduce their risk-weighted assets to meet higher capital requirements (De Jonghe, Dewachter and Ongena, 2020).
- There are fewer clients on the commercial side, and the assets are larger. This higher asset base also suggests that banks are more careful or place more risk-weights on lending on the commercial than the household side (Imbierowicz, Kragh and Rangvid, 2018).
- In South Africa, this means that banks avoid having to pull back on lending on the commercial side as a result of higher capital requirements, with the capital buffer as a first 'shock-absorber'.
- The issue of demand effect remains a concern
- Further capital requirement endogeneity is possible in the form of anticipation effects. We attempt to address these in the paper.

Thank You!

Thank You!

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