The impact of expected losses provisioning on credit growth: the case of Mexico

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The impact of expected losses provisioning on credit growth: the case of Mexico[1]

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[1] The views expressed on this presentation are those of the authors and do not necessarily reflect the opinion of Banco de México or its governing board.

Introduction

- Ever since the last financial crisis, macro-prudential policies have gained importance in terms of financial stability.
- Yet, there are not enough studies on the effectiveness of this policies, and their general impact.
- One of the most relevant effects that should be studied is the effect of macro-prudential policies on credit.
- Here we will study loan loss provisioning, a common micro-prudential policy that in Mexico was given a macro-prudential perspective.

A quick literature review

- Flores *et al* (2010) study loan losses provisioning in Mexico as a macroprudential tool.
- Jiménez *et al* (2012) find that dynamic provisioning in Spain help smooth credit supply cycles.
- Claessens (2013) *et al* find macroprudential policies to be effective in different dimensions.
- Cerutti (2015) *et al* find that these policies help reduce credit growth.
- Levin Konigsberg (2015) finds loan loss provisions in Mexico to be wellfare improving.

Motivation

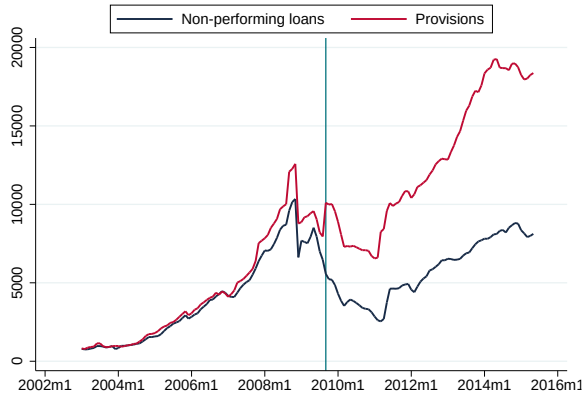
- In Mexico, credit provisioning rules considerably misestimated expected losses.
- To solve this problem, the Mexican regulator changed the provisioning rules.
- The new provisioning rules intend not only to accurately estimate expected losses but also to deal with systemic risk.
- Given this target the new provisioning rules can be considered a macroprudential policy.
- The new rules substantially increase the amount that should be provisioned for each loan. This in turn makes giving credit more expensive for banks.

The old rules

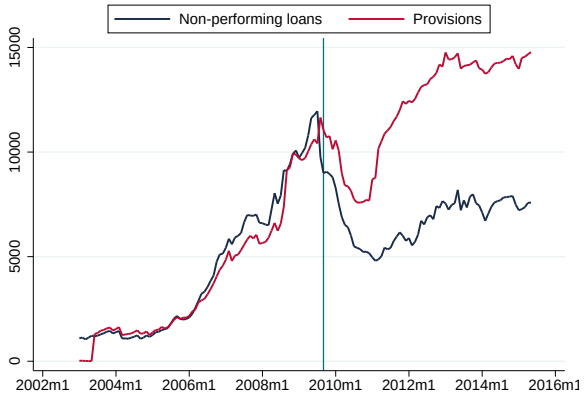
- The old system calculated provisions in an extremely simple fashion.
- Every loan was to be provisioned in a proportion that depended only on how much time its payment was past due.
- As a result provisions were extremely backward-looking and mimicked non-performing loans.

Past due periods	Provisioning proportion
0	0.01
1	0.1
2	0.45
3	0.65
4	0.75
5	0.8
6	0.85
7	0.9
8	0.95
≥ 9	1

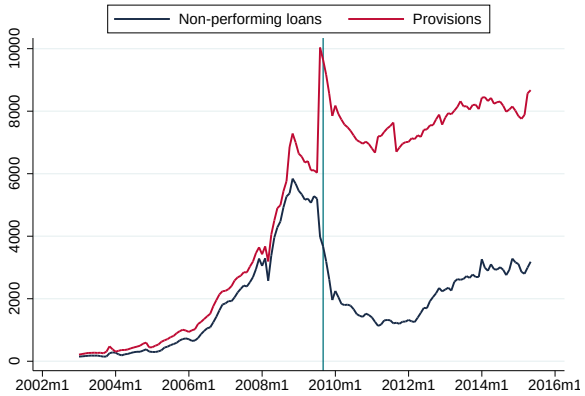
Non-performing loans and provisions
Consumption loans



Bank 1



Bank 2



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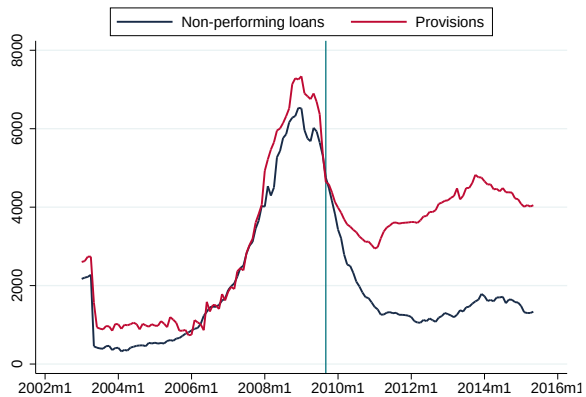
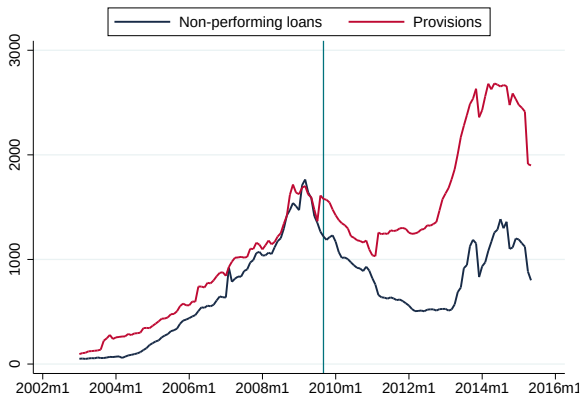
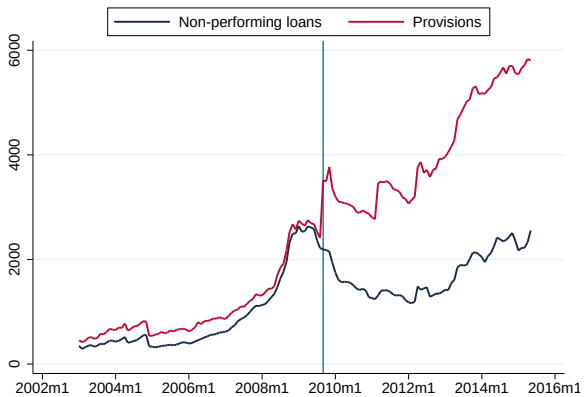


Bank 4



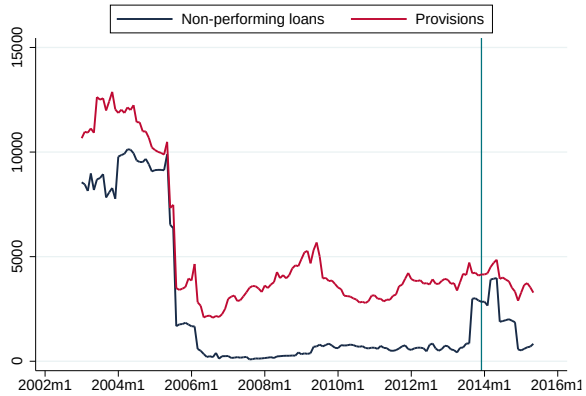
Bank 5



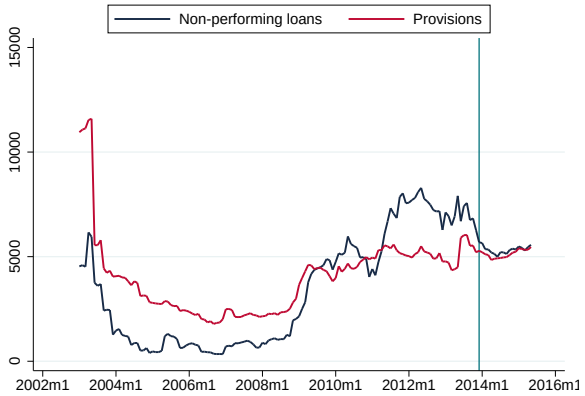
Bank 6

Source: CNBV

Non-performing loans and provisions
Commercial loans



Bank 1



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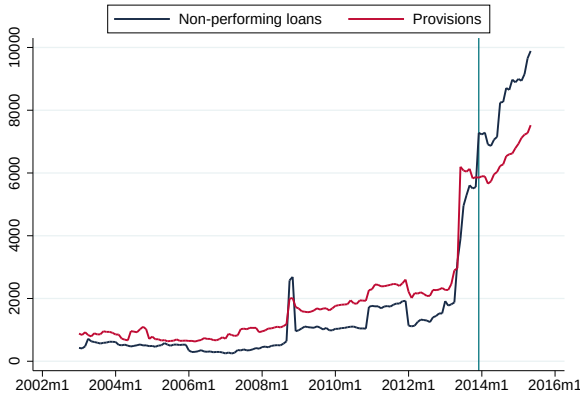

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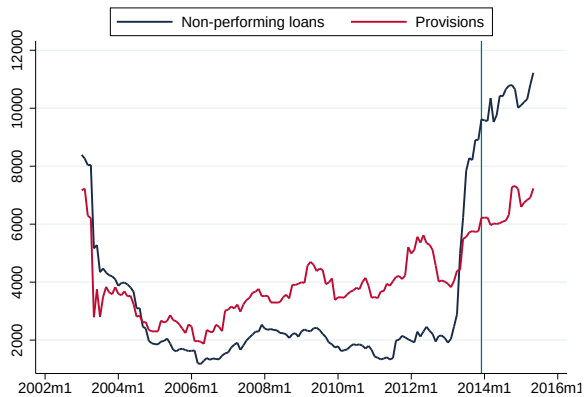
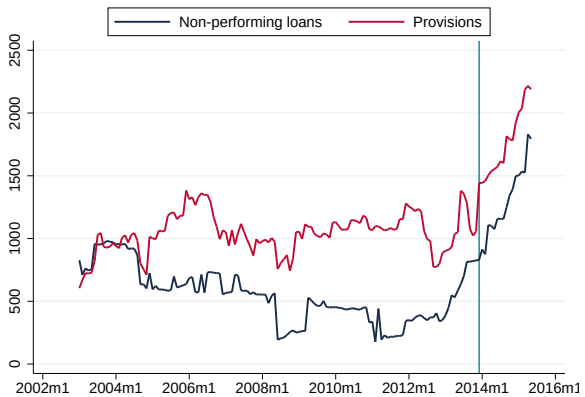
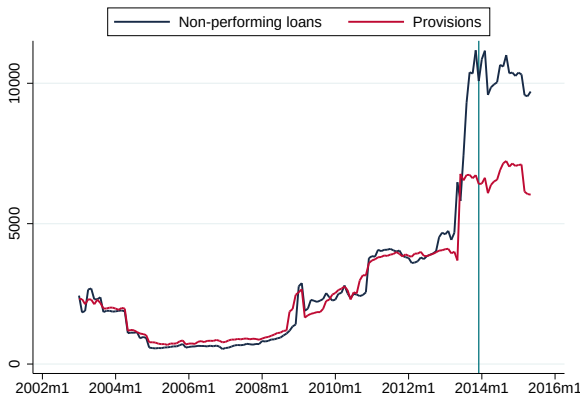


Bank 4



Bank 5



Bank 6

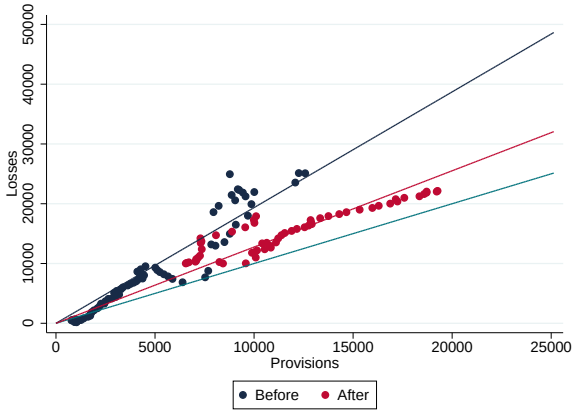
Source: CNBV

The new rules

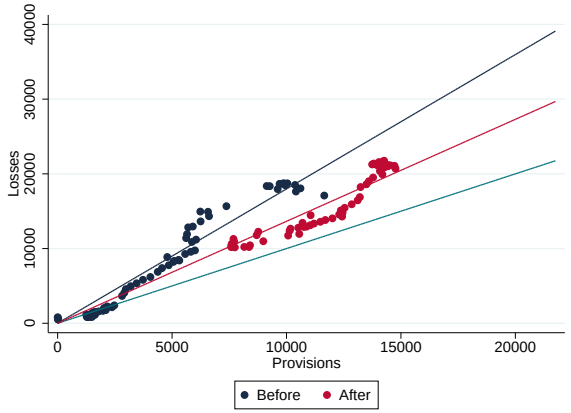
- Basel III framework contemplates the use of expected losses provisioning.
- In Mexico, the Banking Commission (CNBV) modified the methodology used to determine provisions.
- This methodology was introduced in a gradual fashion:
  - Credit cards (October 2009)
  - Non-revolving consumption loans and mortgages (March 2011)
  - Credits granted to state and local governments (October 2011)
  - Commercial loans (June 2013)

- The new rules use econometric techniques to calculate PD, EAD, and LGD on a loan-by-loan basis, to obtain the expected losses of each credit as the product of these three factors.
- PD is estimated for each credit as a function of the credit current characteristics (e.g. arrears, value of the loan, payment periodicity.)
- Although it is not clear that the new provisions reflect the expected loss, they have changed the cost of supplying a loan.

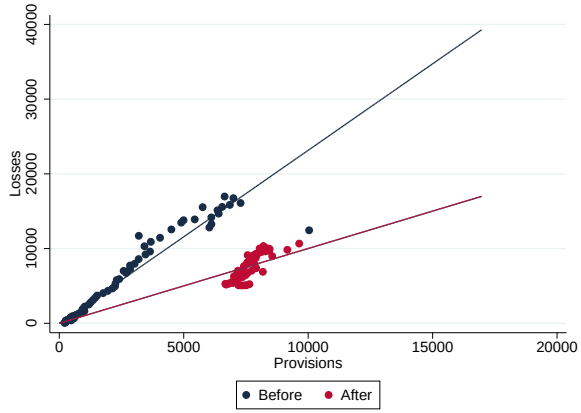
Losses and provisions
Consumption loans



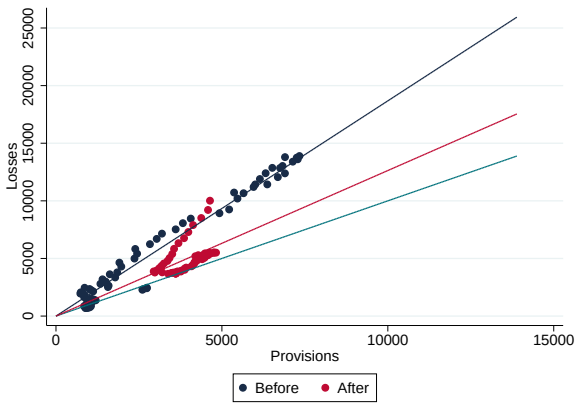
Bank 1



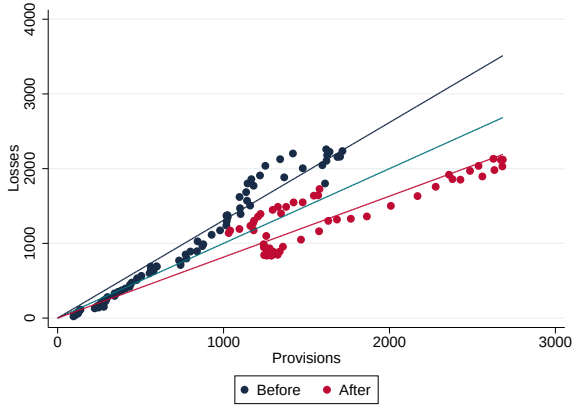
Bank 2



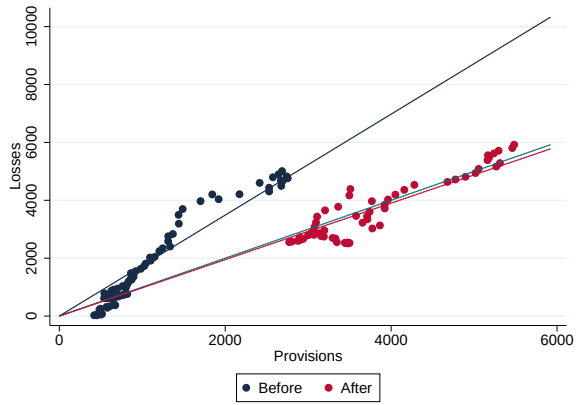
Bank 3



Bank 4



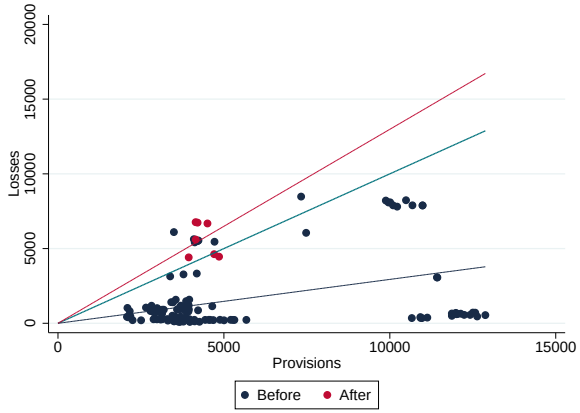
Bank 5



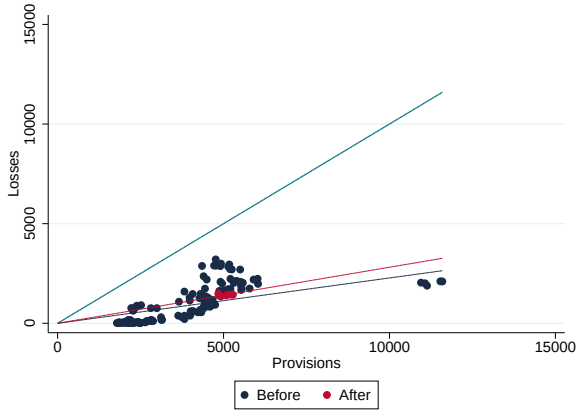
Bank 6

Source: CNBV

Losses and provisions
Commercial loans



Bank 1



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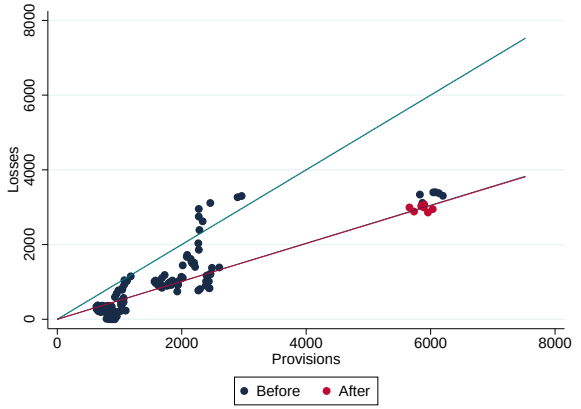

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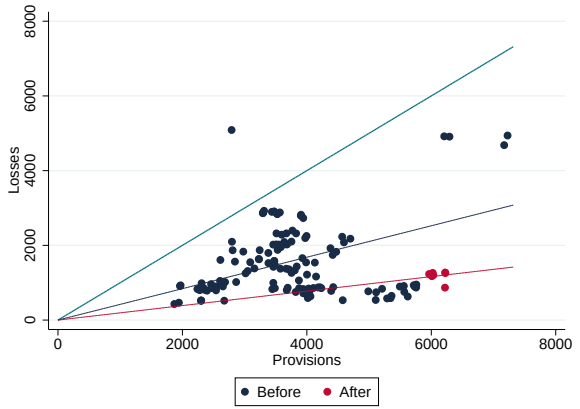
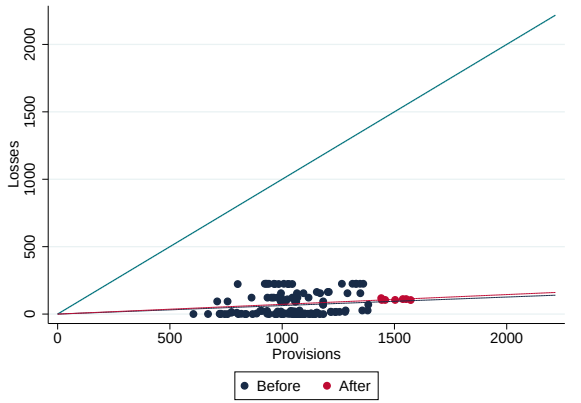
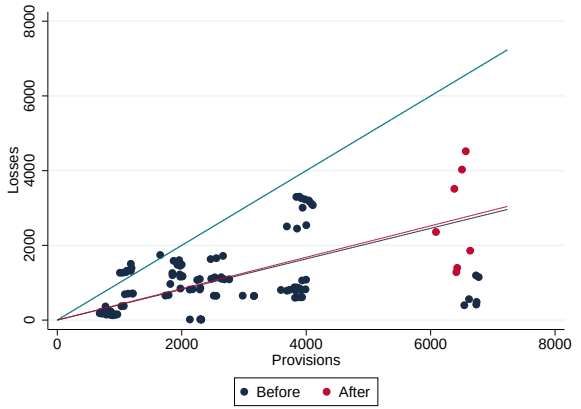


Bank 4



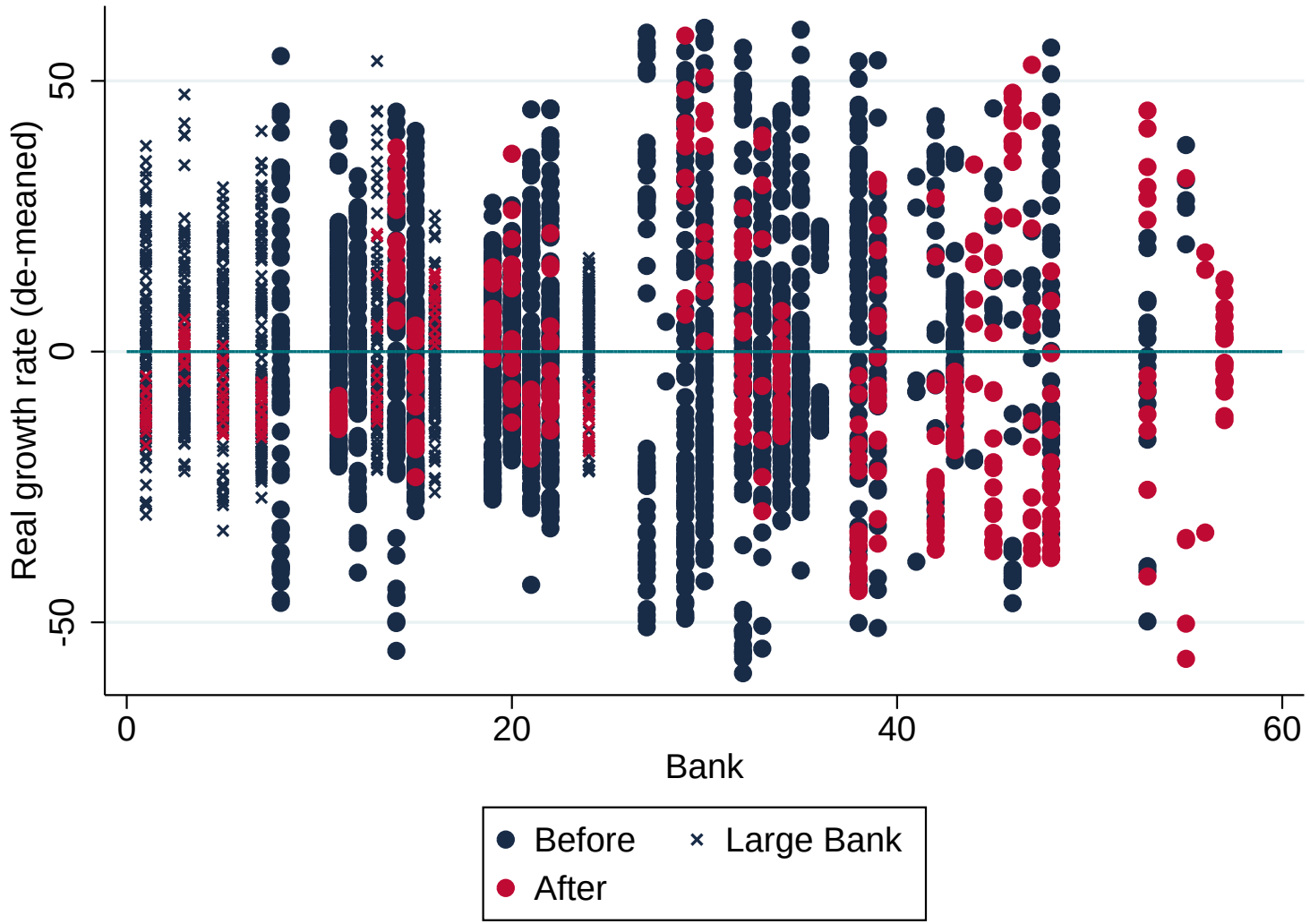
Bank 5



Bank 6

Source: CNBV

Performing loan-value real growth
Commercial loans



Source: CNBV

Data

- For loan information we use regulatory report R04C which consists of the universe of commercial loans given by banks operating in Mexico.
- We use quarterly data at the account level, i.e. our observation unit is the value of the loans outstanding of each creditor on each bank.
- Our sample spans from 2009q3 to 2015q1 and includes around 630,000 different accounts given by 40 different banks.
- We drop one percent observations on each tail.
- Bank balance-sheet data is taken from information published by CNBV, the Mexican supervisor.
- Macroeconomic data is taken from information published by Banco de México.

Summary statistics

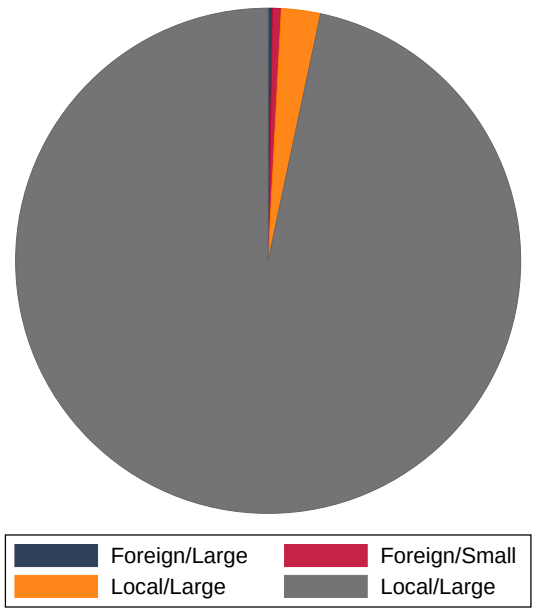
Variable	Description	Mean	S.D.
Δ policy_rate	Change in monetary policy rate	-0.0681	0.1756
Δ log_gdp	Log-change in GDP	0.035	0.0276
fx	USD-MXN exchange rate	13.07	0.8253
current_acc	Current account	-5.86e+07	3.97e+07
log_assets	Log of assets	10.74	1.71
roa	Return on assets	0.4353%	3.16718%
liquidity	Cash and securities to total assets ratio	0.5397	0.2465
funding	Deposit to liabilities ratio	0.5135	0.2709
c_ratio	Tier 1 Capital ratio	16.28[1]	20.08

[1] Median

Summary statistics by currency and firm size (loan growth)

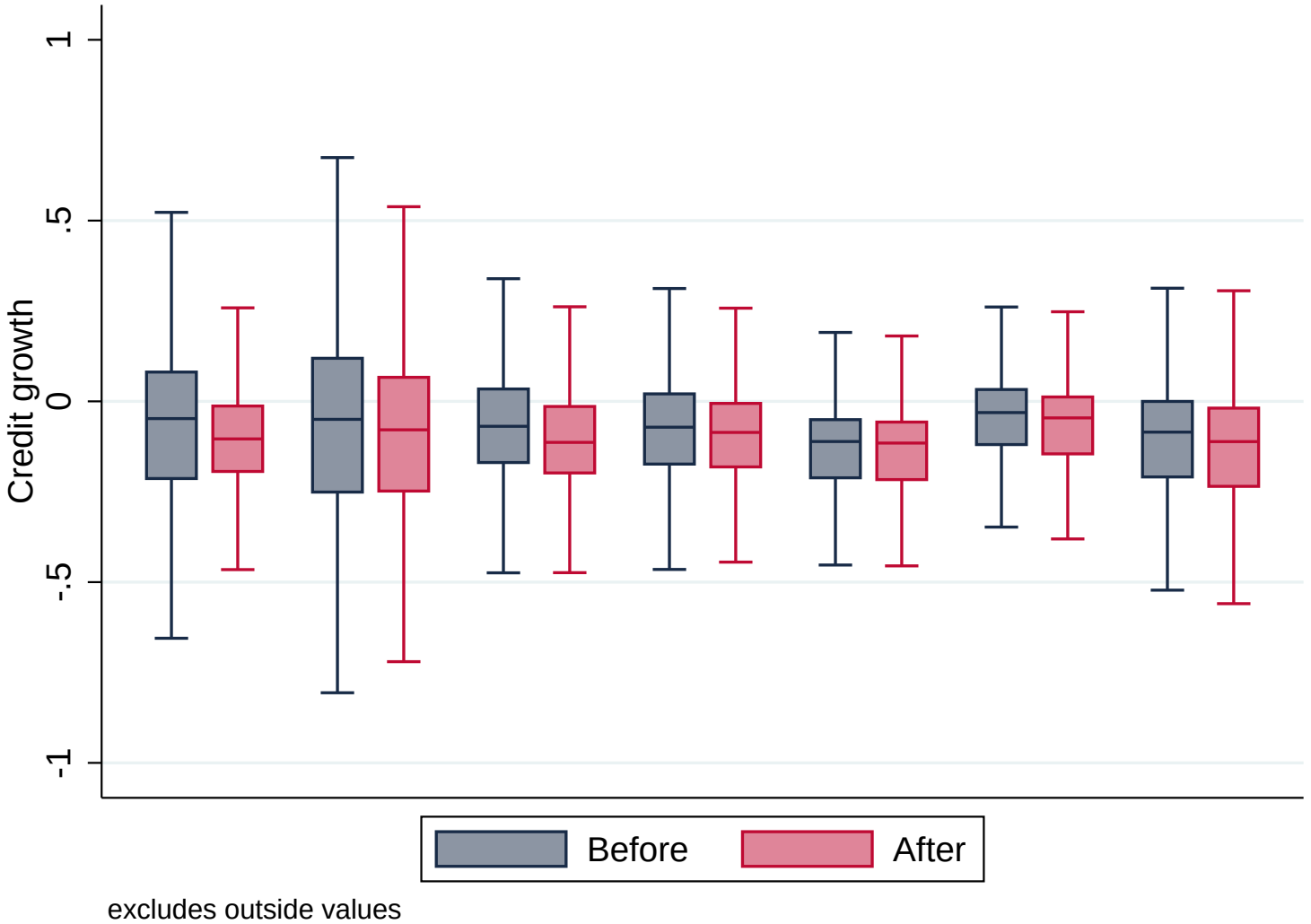
	Observations	
	Large	Medium/Small
Local	144,937	5'726,194
Foreign	21,727	31,358

	Mean	
	Large	Medium/Small
Local	-0.0488	-0.066
Foreign	-0.0274	-0.0331



	S. D.	
	Large	Medium/Small
Local	0.529	0.5937
Foreign	0.5597	0.5332

Loan growth distribution for some banks



Impact of the new provisioning rule on credit growth

To evaluate the impact of the new provisioning rules on credit growth, we estimate the following equation:

$$\Delta \log credit_{ibt} = \alpha_{ib} + \delta_{bt} + \delta^{m}_{bt} + \delta^{n}_{bt} + X'_{t}\beta_1 + Y'_{bt}\beta_2 + \sum_{j=1}^{4} q_{jt} + \varepsilon_{fbt}$$

Where:

- $credit_{ibt}$ is the total value of the outstanding loans given to firm f by bank b at time t.
- δ_{bt} is a dummy variable that is worth for banks using the new methodology from the moment it was implemented.
- δ^{n}_{bt} is a dummy variable that is worth from the moment bank n was authorized to use its own methodology.
- δ^{m}_{bt} is a dummy variable that is worth from the moment bank m was authorized to use its own methodology.
- X_t is a vector of controls that vary across time, macroeconomic variables.
- Y_{bt} is a vector of controls that vary across bank and time, bank-specific characteristics.

Variables of interest

- According to the Mexican regulation, banks may either use the methodology proposed in the regulation or request authorization to use their internal methodology.
- We therefore identify different effects.
- One captured through δ_b, that encompasses the effect of the methodology as established in the regulation.
- And the effect of the use of internal methodologies. One for each bank that is authorized to use internal methodologies (δ_b^n and δ_b^m).

	δ_b		δ_b^n
Bank 1	0	Bank 1	0
Old	0	Old	0
	0		0
New	1	New	0
	1		0
	1		0
Bank 2	0	Bank 2	0
Old	0	Old	0
	0		0
New	1	New	0
	1		0
	1		0
⋮	⋮	⋮	⋮
Bank n	0	Bank n	0
Old	0	Old	0
	0		0
New	0	New	1
	0		1
	0		1
⋮	⋮	⋮	⋮

Regression results for local currency loans

	All	Large	Medium	Sectoral Growth
δ_{bt}	-0.0259***	-0.0136*	-0.0263***	-0.0294***
	(0.00646)	(0.00698)	(0.00668)	(0.00599)
δ^m_{bt}	-0.00354	-0.0123**	-0.00313	-0.00709
	(0.00712)	(0.00487)	(0.00734)	(0.00579)
δ^n_{bt}	0.0181*	0.0311***	0.0179*	0.0159*
	(0.00936)	(0.00592)	(0.00975)	(0.00895)
Δlog_gdp$_t$	-0.0487	-0.0521	-0.0498	1.082
	(0.169)	(0.142)	(0.175)	(0.966)
Δpolicy_rate$_t$	-0.00684	0.0318***	-0.00773	-0.0140
	(0.0107)	(0.0107)	(0.0110)	(0.0151)
Current_Acc$_t$	4.88e-10***	3.77e-10***	4.92e-10***	5.66e-10***
	(1.09e-10)	(7.31e-11)	(1.11e-10)	(1.23e-10)
FX$_t$	-0.0176***	-0.0197***	-0.0175***	-0.0227***
	(0.00455)	(0.00249)	(0.00467)	(0.00650)
VIX$_t$	0.00218***	0.00190***	0.00219***	0.00249***
	(0.000529)	(0.000405)	(0.000546)	(0.000583)
log_assets$_{t-1}$	-0.0766**	-0.00376	-0.0828**	-0.0626*
	(0.0322)	(0.0254)	(0.0337)	(0.0349)
c_ratio$_{t-1}$	0.00222**	0.00213*	0.00224**	0.00262**
	(0.00103)	(0.00107)	(0.00108)	(0.00115)
funding$_{t-1}$	-0.101	-0.0443	-0.102	-0.0248
	(0.158)	(0.107)	(0.159)	(0.129)
liquidity$_{t-1}$	0.0241	0.0503	0.0184	-0.0639
	(0.158)	(0.117)	(0.159)	(0.102)
roa$_{t-1}$	-0.00308	-0.00342	-0.00317	-0.00504
	(0.00251)	(0.00299)	(0.00262)	(0.00338)
Constant	1.174**	0.191	1.259**	1.085**
	(0.452)	(0.324)	(0.473)	(0.468)
Creditor-Banf Fe	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes
Clustered Standard Errors	By bank	By bank	By bank	By bank
Observations	5100904	128802	4972102	5100904
R^2	0.005	0.004	0.005	0.005

Standard errors in parentheses

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

Regression results for foreign currency loans

	All	Large	Medium	Sectoral Growth
δ_{bt}	-0.0191**	-0.0141	-0.0232*	-0.0230**
	(0.00847)	(0.0173)	(0.0126)	(0.00980)
δ^m_{bt}	-0.00404	0.0327*	-0.0273**	-0.00704
	(0.0115)	(0.0189)	(0.0116)	(0.0122)
$\delta_{bt} n$	0.0180*	0.0413***	0.00418	0.0151
	(0.00953)	(0.0123)	(0.0123)	(0.0105)
Δlog_gdp$_t$	-0.230	0.0615	-0.389	0.315
	(0.436)	(0.579)	(0.479)	(1.000)
Δpolicy_rate$_t$	-0.0181	0.0244	-0.0465	-0.0383
	(0.0299)	(0.0283)	(0.0467)	(0.0449)
Current_Acc$_t$	3.44e-10*	1.99e-10	4.77e-10**	3.64e-10**
	(1.85e-10)	(1.54e-10)	(2.10e-10)	(1.66e-10)
FX$_t$	-0.0180**	-0.0194**	-0.0175**	-0.0210***
	(0.00711)	(0.00904)	(0.00822)	(0.00706)
VIX$_t$	0.00313***	0.00203	0.00401***	0.00384***
	(0.000615)	(0.00132)	(0.000778)	(0.000776)
log_assets$_{t-1}$	-0.0696*	-0.0983	-0.0475	-0.0645*
	(0.0354)	(0.0577)	(0.0388)	(0.0351)
c_ratio$_{t-1}$	-0.0000512	-0.0000906	-0.000197	-0.0000520
	(0.000335)	(0.000859)	(0.000335)	(0.000337)
funding$_{t-1}$	-0.0542	-0.271	0.0920	-0.0182
	(0.106)	(0.193)	(0.142)	(0.114)
liquidity$_{t-1}$	-0.0201	0.188	-0.169	-0.0721
	(0.109)	(0.157)	(0.145)	(0.112)
roa$_{t-1}$	-0.00432	-0.00855	0.00127	-0.00592
	(0.00427)	(0.00527)	(0.00743)	(0.00464)
Constant	1.107**	1.542**	0.791	1.068**
	(0.477)	(0.736)	(0.543)	(0.473)
Creditor-Bank FE	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes
Clustered Standard Errors	By bank	By bank	By bank	By bank
Observations	44779	18771	26008	44779
R^2	0.006	0.007	0.007	0.009

Standard errors in parentheses

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

In order to analyze the interaction of the provisioning policy with economic growth and monetry policy, we estimate the following equations:

$$\Delta \log credit_{ibt} = \alpha_{ib} + \delta_{bt} + \delta^m_{bt} + \delta^n_{bt} + \Delta \log gdp_t \delta_{bt} + \Delta \log gdp_t \delta^m_{bt} + \Delta \log gdp_t \delta^n_{bt} + X'_t \beta_1 + Y'_{bt} \beta_2 + \sum_{j=1}^{4} q_{jt} + \varepsilon_{fbt}$$

$$\Delta \log credit_{ibt} = \alpha_{ib} + \delta_{bt} + \delta^m_{bt} + \delta^n_{bt} + \Delta pol\_rate_t \delta_{bt} + \Delta pol\_rate_t \delta^m_{bt} + \Delta pol\_rate \delta^n_{bt} + X'_t \beta_1 + Y'_{bt} \beta_2 + \sum_{j=1}^{4} q_{jt} + \varepsilon_{fbt}$$

Regression results for foreign currency loans

	Local currency	Local currency	Foreign currency	Foreign currency
δ_{bt}	-0.0188	-0.0190***	-0.0126	-0.00273
	(0.0124)	(0.00649)	(0.0106)	(0.00788)
δ^m_{bt}	0.00333	0.00547	-0.0154	0.0142
	(0.0113)	(0.00777)	(0.0170)	(0.0125)
δ^n_{bt}	0.0326***	0.0272***	0.0297**	0.0302***
	(0.0118)	(0.00982)	(0.0116)	(0.00780)
Δlog_gdp$_t$	-0.144	-0.277	-0.277	-0.698
	(0.146)	(0.184)	(0.471)	(0.672)
Δlog_gdp$_t \times \delta_{bt}$		-0.212		-1.214**
		(0.211)		(0.476)
Δlog_gdp$_t \times \delta^m_{bt}$		-0.721***		-1.352***
		(0.228)		(0.343)
Δlog_gdp$_t \times \delta^n_{bt}$		-1.086***		-0.286
		(0.246)		(0.313)
Δpolicy_rate$_t$	-0.0327*		-0.0301	
	(0.0179)		(0.0370)	
Δpolicy_rate$_t \times \delta_{bt}$	0.0377		0.0371	
	(0.0343)		(0.0369)	
Δpolicy_rate$_t \times \delta^m_{bt}$	0.0372		-0.0602	
	(0.0276)		(0.0485)	
Δpolicy_rate$_t \times \delta^n_{bt}$	0.0838***		0.0637	
	(0.0271)		(0.0446)	
Current_Acc$_t$	5.33e-10***	5.61e-10***	3.62e-10*	4.74e-10**
	(1.22e-10)	(1.23e-10)	(1.96e-10)	(2.22e-10)
FX$_t$	-0.0200***	-0.0227***	-0.0190**	-0.0275***
	(0.00540)	(0.00530)	(0.00778)	(0.00466)
VIX$_t$	0.00232***	0.00242***	0.00319***	0.00355***
	(0.000576)	(0.000568)	(0.000665)	(0.000644)
log_activo$_{t-1}$	-0.0764**	-0.0699*	-0.0685*	-0.0607*
	(0.0317)	(0.0351)	(0.0351)	(0.0355)
c_ratio$_{t-1}$	0.00230**	0.00251**	-0.0000346	-0.0000995
	(0.00104)	(0.00116)	(0.000352)	(0.000344)
funding$_{t-1}$	-0.0764	-0.0248	-0.0596	0.0163
	(0.160)	(0.163)	(0.110)	(0.117)
liquidity$_{t-1}$	0.00747	-0.0408	-0.0307	-0.0686
	(0.161)	(0.161)	(0.108)	(0.108)
roa$_{t-1}$	-0.00425	-0.00331	-0.00501	-0.00485
	(0.00263)	(0.00305)	(0.00430)	(0.00505)
Constant	1.199**	1.141**	1.117**	1.106**
	(0.443)	(0.476)	(0.474)	(0.460)
Creditor-Banf Fe	Yes	Yes	Yes	Yes
Seasonal Dummies	Yes	Yes	Yes	Yes
Clustered Standard Errors	By bank	By bank	By bank	By bank
Observations	5100904	5100904	44779	44779
R^2	0.005	0.005	0.006	0.007

Standard errors in parentheses

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

Conclusions

- The new provisioning rules in Mexico had a negative impact on credit growth.
- When taking in consideration the size of the firm, this negative effect is smaller for large firms than for medium and small-sized firms. This may be due to their relative less-riskiness.
- The effect appears to be smaller for foreign currency-denominated loans. In any case, we do not find a significant effect for large firms in foreign currency-denominated loans.

- Banks that use internal models to calculate their provisions appear to, in some cases, have increased credit. This suggests that internal models allow banks to manage their costs more efficiently.
- There appears to be no interaction between the new provisioning policy and monetary policy. An important caveat to this is that in our period of study, there is only loosening of monetary policy.
- As of the interaction of the policy with economic growth, we find a negative interaction between the internal models and economic growth.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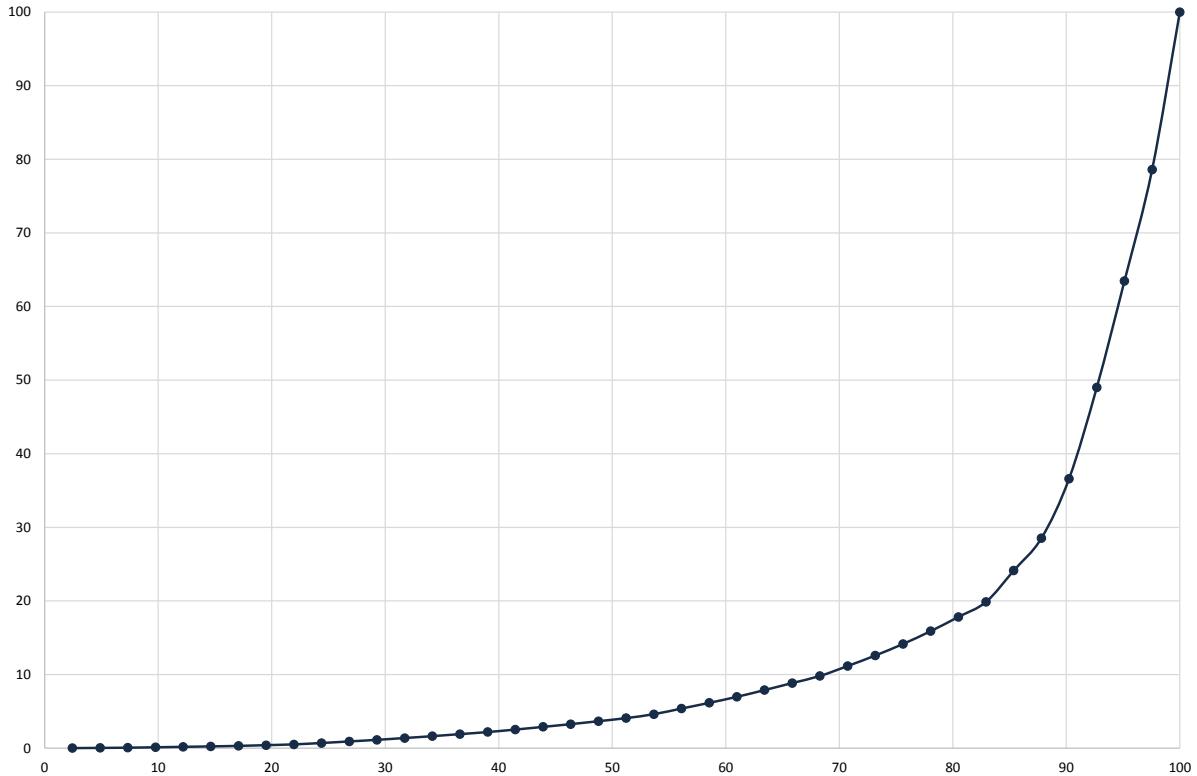
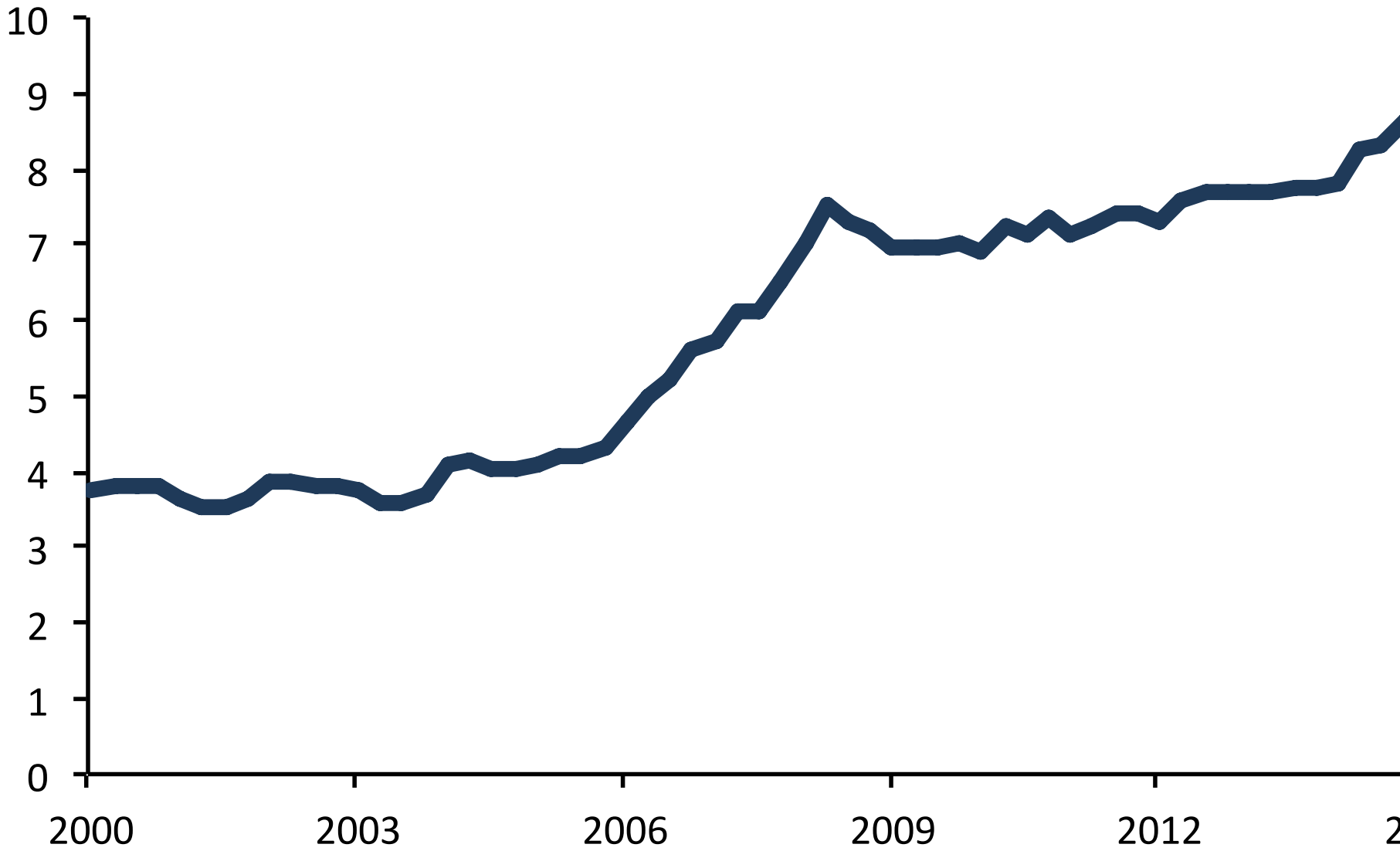
Appendices

Mexican banking system Lorentz curve



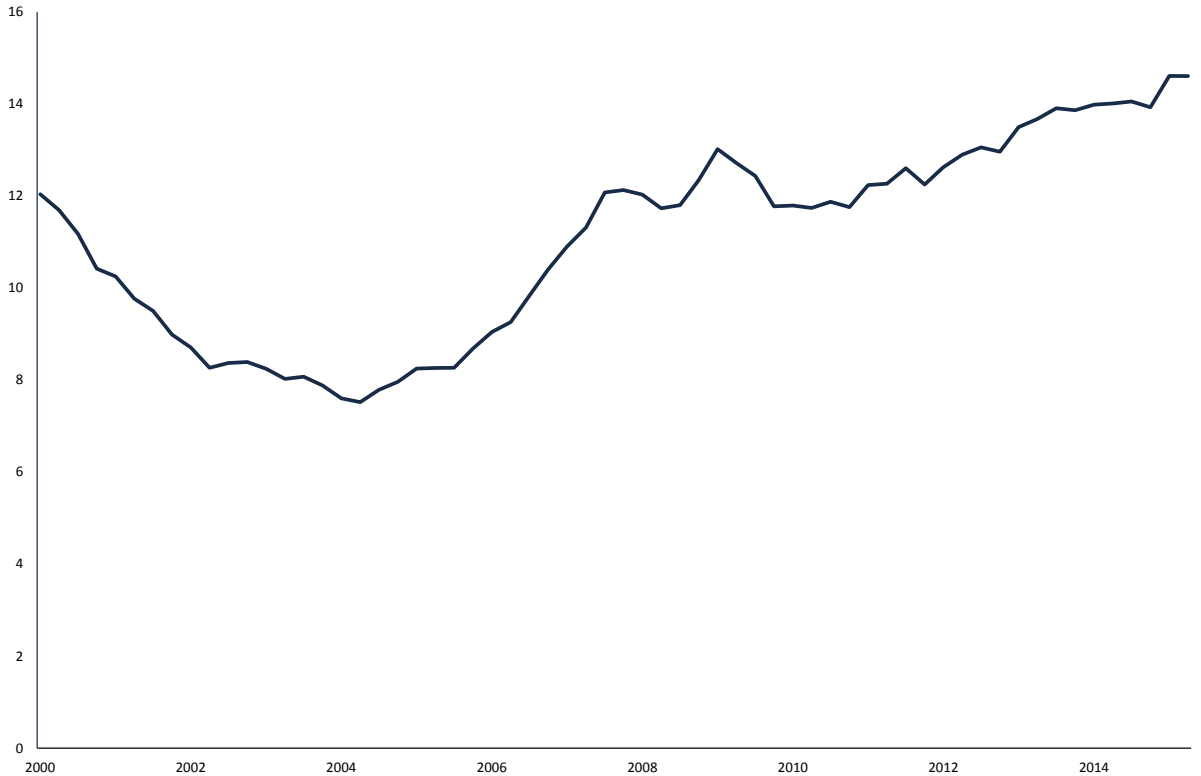
Source: CNBV

Commercial credit to GDP ratio



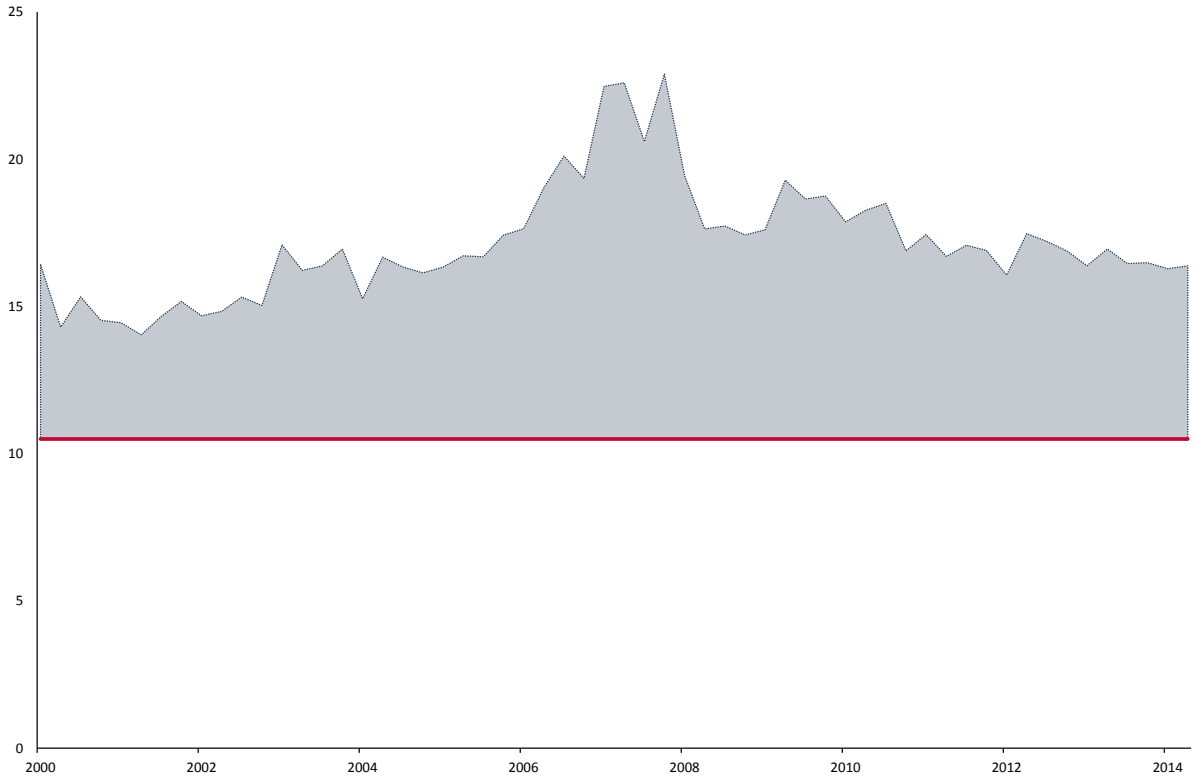
Source: Banco de México

Credit to GDP ratio



Source: Banco de México

Mexican banking system capital adequacy ratio



Source: CNBV