

MACROPRUDENTIAL POLICIES IN PERU: THE EFFECTS OF DYNAMIC PROVISIONING AND CONDITIONAL RESERVE REQUIREMENTS*

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The views expressed in this paper are those of the authors and do not necessarily reflect those of the Central Reserve Bank of Peru..



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Motivation

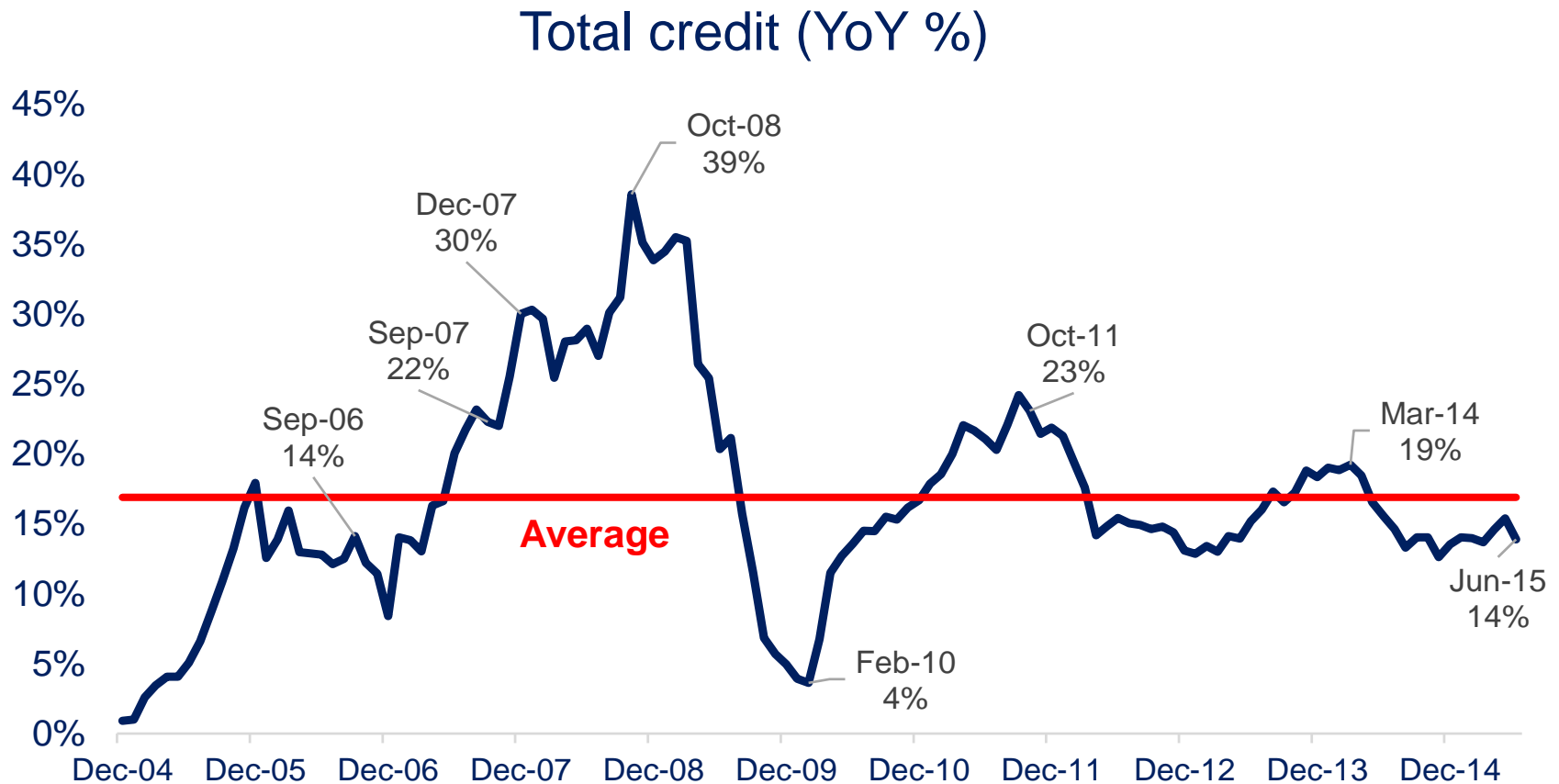
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- In the last years, Peru, as many other economies, had been active in the use of macro-prudential tools carried out under the coordination between Central Bank, Supervisory Authority of Banks and the Ministry of Economy.
- The purpose of the macro-prudential tools implemented in Peru had been limiting the potential adverse effects of an excessive growth of credit over the economy.
- This paper evaluates the effectiveness of macroprudential policies using micro data at the bank-client level. Main questions to be addressed: What is the impact of MPP on credit? What is the impact of MPP on bank risk? Do responses to macroprudential shock differ by types of banks?

In the past, Peru faced an excessive credit growth.

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Macroprudential goal: Control the excessive credit growth



Main macro-prudential tools implemented in Peru

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- **Dynamic provisioning (SBS, Nov-2008).**
- Additional capital requirements for household debt according to the type of credit and the currency granted. (SBS, Nov-2012).
- Additional capital requirements for financial institutions that give loans to agents that are exposed to exchange risk (SBS, Nov-2012).
- Tighter liquidity requirements (SBS, Dec-2012).
- Higher reserve requirements for deposits in foreign currency (BCRP).
- **Additional reserve requirements conditional on their evolution of loans in foreign currency (BCRP).**

Dynamic Provisioning: How does it work?

Rule for activation depends on GDP

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Activation's Rule:

At least, one indicator satisfies:

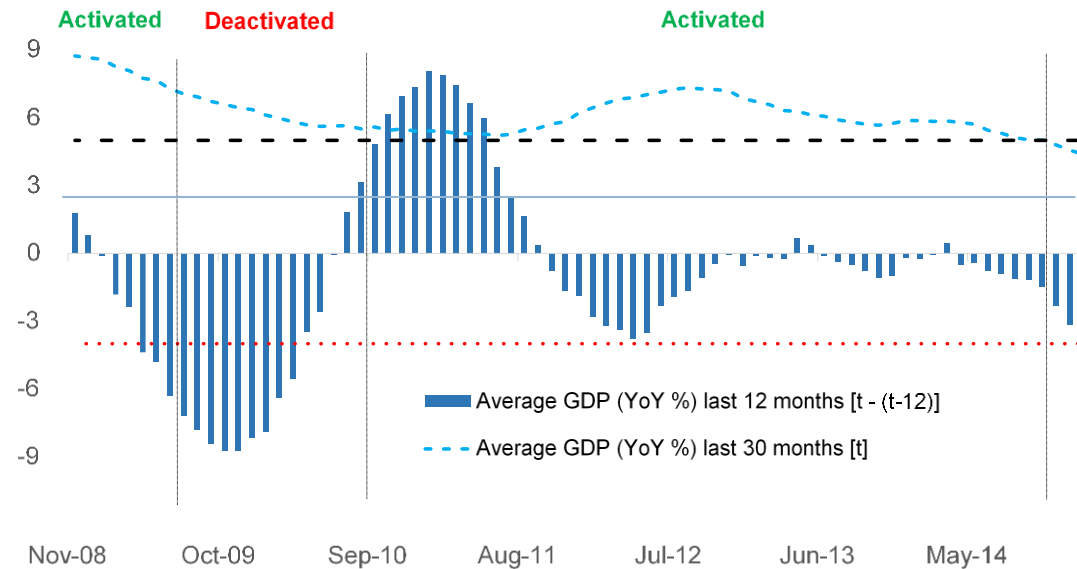
1,- Average GDP (YoY %) of last 30 months passes is higher than 5%.

2,- Average GDP (YoY%) of the last 12 months is outside is higher by 2% to this same indicator a year earlier.

Deactivation's Rule:

Average GDP (YoY %) of last 30 months is less than 5%.

Average GDP (YoY %) of the last 12 months is lower by 4% to this same indicator a year earlier.



Additional RRs conditional on the evolution of credit in foreign currency

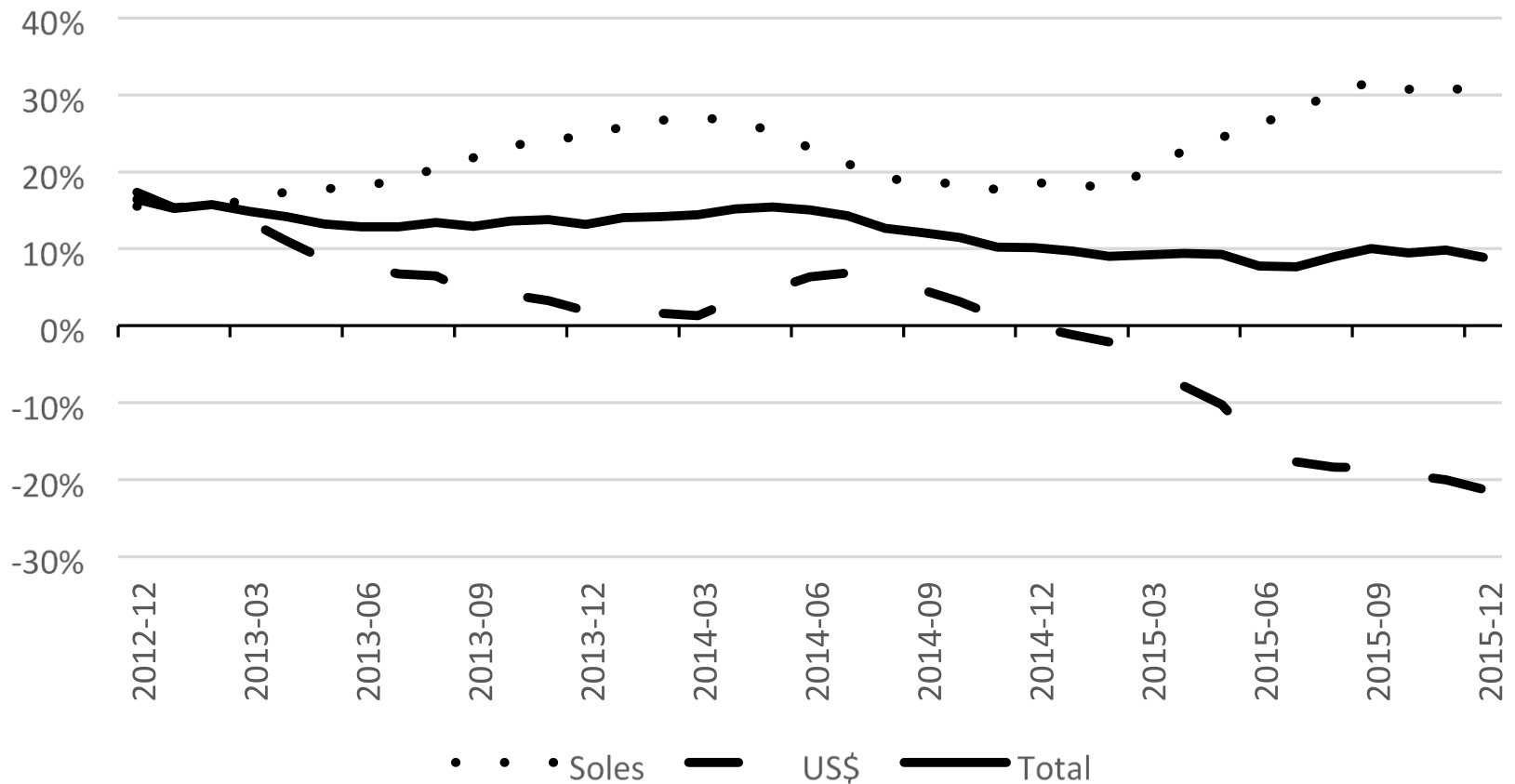
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- At the beginning, the scheme was conditional on credit growth. There were three limits (10%, 15% and 20%) to dollar credit growth. Banks that exceeded those limits faced additional RRs (1.5%, 3% and 5%, respectively).
- In the case of households, automobile loans and mortgages were imposed with limits of 10% and 20%, and the additional RRs were 0.75% and 1.5%, respectively.
- In the end of 2014, the previous scheme was changed to a new set-up that required reductions in the balance of dollar loans. Banks had to reduce, by December 2015, the stock of dollar credit to at least 90 percent of the Sep 2013 balance. In the case of households, the reduction was 85% of the Sep 2013 balance.

Credit in foreign currency decreased significantly in 2015.

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Credit to the private sector by currency (Var. % YoY)



Data: Credit Registry

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- The Credit Register database contains information at a very disaggregate level of loans outstanding in both domestic and foreign currencies.
- Commercial loans from 2004:Q2 to 2014:Q4 are analysed to estimate the impact of macroprudential instruments. Firms have a minimum outstanding loan of 300 thousand dollars at least in one quarter of the sample (covering around 80% of total commercial loans).
- The sample for evaluation of conditional reserve requirements was expanded to the third quarter of 2015, in order to have more observations where conditional RRs were active.

Data: Dependent and control variables

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- Dependent variables are real quarterly credit growth, the dollarization ratio of mortgage loans, and the non-performing loans rate for mortgages.

- Control variables were divided into two groups:
 - Bank controls: size (measured by total assets), leverage ratio, liquidity ratio (loan to deposits).
 - Macroeconomic controls: interbank interest rate, exchange rate, current account balance and GDP.

We control for reserve requirements for each bank in both currencies and drop out extreme values.

Summary of statistics of main variables

	Mean	Median	Std. Dev.	10 Percentile	90 Percentile
Levels					
Bank Assets (Mill. S/)	28 699	22 852	23 732	3 113	62 41
Capital Ratio (%)	13.09	12.87	1.52	11.29	15.0
Deposits to Liabilities (%)	76.38	75.71	6.13	69.98	83.5
Liquidity Ratio (%)	39.57	36.62	16.48	20.35	64.4
RR in Domestic Currency (%)	10.13	7.65	5.02	6.00	17.4
RR in Foreign Currency (%)	29.65	27.84	6.56	24.35	41.4
Growth Rates					
Credit (%)	-2.66	-5.21	66.23	-56.65	59.7

Empirical Strategy and Results

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- **Dynamic Provisioning Effects:** the following base regression equation is performed:

$$Y_{i,b,t} = \sum_{j=0}^3 X'_{t-j} \times \beta^j + \sum_{j=0}^3 Z'_{b,t-j} \times \theta^j + MP_{t-1} \times \gamma^1 + u_{i,b,t}$$

- $Y_{i;b;t}$ is the real credit growth of debtor-i in bank-j at time t
- X_s stands for the macro control variables.
- $Z_{b;s}$ is the matrix of bank controls; and MP_{t-1} expresses the dynamic provisioning scheme at previous time.
- For the dynamic provisioning:

$$MP_t = \begin{cases} 1, & \text{if dynamic provisioning is "activated".} \\ -1, & \text{if dynamic provisioning is "deactivated".} \\ 0, & \text{otherwise.} \end{cases}$$

Dynamic provisioning tends to reduce the procyclicality of commercial loans for a restricted estimation. The cumulated effect of dynamic provisioning is also significant and greater than the first-lag effect.

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	First lag effect		Contemporaneous and lagged effect	
	Coef.	p-value	Coef.	p-value
Macroeconomic control				
Δ Exchange rate (t)	-0,065 *	0,10	-0,095 **	0,03
(t-1)	-0,203 ***	0,00	-0,204 ***	0,00
(t-2)	-0,148 ***	0,00	-0,099 *	0,07
(t-3)	0,146 ***	0,00	0,140 ***	0,01
Δ Interbank rate (t)	0,002	0,45	-0,001	0,81
(t-1)	0,004	0,14	0,009 **	0,02
(t-2)	0,009 ***	0,00	0,007 **	0,04
(t-3)	0,007 ***	0,00	0,017 ***	0,00
Bank controls				
Capital ratio (t)	0,001	0,51	0,001	0,60
(t-1)	- 0,001	0,50	-0,001	0,67
(t-2)	0,005 ***	0,00	0,005 ***	0
(t-3)	- 0,001	0,18	-0,001	0,28
Log (Total assets) (t)	-0,098 ***	0,00	-0,092 ***	0,00
(t-1)	0,090 ***	0,01	0,091 ***	0,01
(t-2)	-0,082 ***	0,01	-0,093 ***	0,00
(t-3)	-0,023	0,32	-0,008	0,73
Dynamic Provisions				
Prov (t)			-0,011 **	0,03
(t-1)	-0,014 ***	0,00	-0,009	0,06
(t-2)			-0,012 ***	0,01
(t-3)			0,010 ***	0,00
Others				
Seasonal effects	Yes		Yes	
Constant	1,046 ***	0,00	0,938 ***	0

A tightening position in the Dynamic provisioning tends to reduce credit growth, and an easing position tends to increase credit growth, although the latter effect is not statistical significant.

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	First lag effect		Contemporaneous and lagged effect	
	Coef.	p-value	Coef.	p-value
Macroeconomic control				
Δ Exchange rate (t)	-0,069 *	0,08	-0.055	0,22
(t-1)	-0,124 **	0,02	-0,197 ***	0,00
(t-2)	-0,101 **	0,05	-0,095	0,12
(t-3)	0,227 ***	0,00	0,157 ***	0,01
Δ Interbank rate (t)	-0,001	0,82	-0,003	0,54
(t-1)	0,002	0,53	-0,002	0,67
(t-2)	0,010 ***	0,00	0,005	0,15
(t-3)	0,005 **	0,03	0,019 ***	0,00
Dynamic Provisions				
Tightening (t)			-0,036 ***	0,00
(t-1)	-0,040 ***	0,00	-0,029 **	0,05
(t-2)			0,004	0,80
(t-3)			0,009	0,58
Easing (t)			-0,032 ***	0,01
(t-1)	-0,005	0,41	0.001	0,97
(t-2)			0,046 ***	0,01
(t-3)			-0,010	0,58
Others				
Seasonal effets	Yes		Yes	
Constant	0,798 ***	0	0,752 ***	0,00

Empirical Strategy and Results

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- **Conditional Reserve Requirements Effects:**
we encode the dummy variables as following

$$PdDollar_t = \begin{cases} 1, & \text{if De - Dollarization Program is active.} \\ 0, & \text{otherwise.} \end{cases}$$

The dependent variable analysed are mortgage dollarization rate and non-performing mortgage loans rate.

The effect of conditional reserve requirements is statistically significant in the first lag of the macroprudential dummy variable (and contemporaneous and lagged effects up to the third lag).

	Contemporaneous Effect		First Lag Effect		Contemporaneous and Lagged Effects	
	Coef.	P-value	Coef.	P-value	Coef.	P-value
<i>Macroeconomic controls</i>						
Δ Exchange rate (t)	5,885	0,327	7,530	0,135	6,172	0,279
(t-1)	9,132 *	0,082	11,621 **	0,020	8,972	0,108
(t-2)	-2,997	0,459	0,228	0,958	0,918	0,837
(t-2)	10,963 ***	0,001	13,388 ***	0,000	14,374 ***	0,000
Δ Interbank rate (t)	-0,304	0,343	-0,298	0,349	-0,289	0,382
(t-1)	1,290 ***	0,001	1,229 ***	0,001	1,238 ***	0,001
(t-2)	-0,014	0,909	-0,078	0,535	-0,015	0,923
(t-3)	1,253 ***	0,000	1,226 ***	0,000	1,174 ***	0,000
Δ Gross Domestic Product (t)	80,436 ***	0,004	73,872 ***	0,007	28,824	0,318
(t-1)	-120,534 ***	0,003	-108,405 ***	0,007	-69,581 **	0,045
(t-2)	8,243	0,773	21,697	0,442	8,376	0,818
(t-3)	-77,699 **	0,016	-80,796 **	0,019	-60,325 **	0,039
Log (Total assets) (t)	-3,504 ***	0,007	-3,383 ***	0,007	-3,091 ***	0,008
(t-1)	0,292	0,717	0,295	0,639	0,221	0,696
(t-2)	0,374	0,647	0,480 **	0,529	0,436	0,548
(t-3)	2,317	0,115	2,313 *	0,088	2,098	0,112
PdDollar	-0,489	0,447			1,686	0,147
PdDollar (t-1)			-1,016 **	0,051	-2,362 ***	0,004
PdDollar (t-2)					0,785 *	0,098
PdDollar (t-3)					-1,130 *	0,085
Constant	2,964	0,576	0,808	0,869	1,389	0,783

The macroprudential tool has not effect on non-performing loans (similar result when controlling for the proportion of dollarized mortgages).

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	Contemporaneous Effect		First Lag Effect		Contemporaneous and Lagged Effects	
	Coef.	P-value	Coef.	P-value	Coef.	P-value
Macroeconomic controls						
Δ Exchange rate (t)	-0,557	0,769	-2,108	0,514	-4,880 **	0,016
(t-1)	0,889	0,726	-1,214	0,547	-3,310 *	0,070
(t-2)	-16,152	0,252	-18,366	0,384	-36,929 **	0,024
(t-2)	-9,886 *	0,085	-3,989	0,448	-11,343 **	0,038
Δ Interbank rate (t)	0,330	0,300	0,330	0,435	0,852 **	0,017
(t-1)	-0,196	0,611	0,269	0,243	0,025	0,876
(t-2)	-0,272	0,439	0,154	0,350	-0,287	0,205
(t-3)	0,402	0,133	0,405	0,330	0,818 **	0,036
Δ Gross Domestic Product (t)	100,559 **	0,046	60,643	0,384	191,809 **	0,043
(t-1)	-84,464 **	0,046	-55,132	0,381	-195,840 **	0,049
(t-2)	15,452	0,447	-13,543	0,417	29,578	0,189
(t-3)	-68,778 **	0,032	-48,379	0,314	-132,325 **	0,041
Δ Current Account (t)	0,000	0,192	0,000	0,450	0,001 **	0,034
(t-1)	0,000	0,696	0,000	0,311	0,000	0,682
(t-2)	0,000	0,216	0,000	0,244	0,000	0,155
(t-3)	0,000	0,107	0,000	0,432	-0,001 **	0,028
Reserve Requirements						
Foreign Currency (t)	0,031	0,444	-0,014 **	0,081	0,038	0,361
(t-1)	0,061 **	0,050	0,037	0,282	0,072 *	0,053
(t-2)	0,008	0,582	0,009	0,348	0,010	0,562
(t-3)	0,016	0,359	0,005	0,556	0,024	0,428
Bank controls						
Capital Ratio (t)	0,005	0,522	0,005	0,575	0,005	0,523
(t-1)	0,005	0,379	-0,002	0,762	0,005	0,378
(t-2)	0,007	0,466	0,015 **	0,053	0,007	0,466
(t-3)	0,007	0,230	-0,010 **	0,043	0,007	0,230
Liquidity ratio (t)	-0,003	0,252	-0,001	0,390	-0,003	0,250
(t-1)	-0,002	0,500	-0,001	0,712	-0,002	0,500
(t-2)	0,006 **	0,069	0,007 ***	0,004	0,006 *	0,069
(t-3)	0,000	0,881	-0,004	0,126	0,000	0,883
Log (Total assets) (t)	0,321	0,225	0,141	0,418	0,320	0,225
(t-1)	0,104	0,517	0,158	0,381	0,104	0,516
(t-2)	-0,213	0,135	-0,397 **	0,016	-0,213	0,135
(t-3)	-0,214	0,231	0,096	0,489	-0,214	0,232
PdDollar	0,927 *	0,058			1,948 *	0,081
PdDollar (t-1)			0,591	0,390	omitted	
PdDollar (t-2)					-1,214 *	0,099
PdDollar (t-3)					0,685	0,218
Constant	-0,261	0,780	0,419	0,397	0,495	0,633

Conclusions

- This paper uses micro registry data to analyse the impact of dynamic provisioning and conditional reserve requirements on commercial credit growth, mortgage dollarisation and non-performing loan rates.
- We find that a tightening (easing) of dynamic provisioning in Peru decelerated (accelerated) the growth of commercial lending. This suggests that implementation of this macroprudential instrument contributed partially at reducing credit procyclicality.
- In the case of the Dedollarisation Programme, our empirical evidence is that the programme creates incentives for banks to substitute dollar-denominated loans and expand credit in domestic currency, especially in sectors with high exposure to exchange risk, such as mortgages loans.
- However, the effect of the programme on the non-performing loans rate – an alternative measure of financial vulnerability – is not conclusive.