Regulation and bank lending in South Africa: A narrative index approach

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Duma.

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1 Introduction (Duma and Kea)

The pursuit for financial stability through macro-prudential policies could potentially imply financial exclusion, particularly in emerging countries such as South Africa. For instance, economic growth and development could be promoted through increased lending to small and medium businesses, who are riskier to lend to. However, macro-prudential policies are by nature aimed at reducing risks associated with lending. Therefore, a natural question that arises is whether macro-prudential policy is a constraint to or consistent with financial inclusion or greater banking competition?

2 Literature Review (Duma and Kea)

Our paper encompasses and contributes to various strands of literature. It firstly encompasses literature on the response of banks to macroprudential reforms and secondly, the response of banks to external efforts aimed at enabling financial inclusion. The construction of narrative macroprudential reforms and narrative accounts of financial inclusion encompass literature on narrative methods of identification.

The objective(s) of macroprudential reforms are well documented and continue to expand with further reforms being introduced to create resilient banking systems[1]. The ongoing debate regarding the implications of the reforms, particularly on lending behaviour of banks provide further insight on the costs and benefits of making banking systems resilient through the reforms.

Evidently, work on the cost or unintended consequences of macroprudential reforms have dominated the debate. Noss and Toffano (2016) highlight that tightened macroprudential capital requirements can cause banks' cost of funding to rise and in turn, prompt banks to pass the increase in their cost of funding to borrowers in the form of high interest on loans and/or reduction in credit extended. Deli and Hasan (2017) show that higher capital requirements would lead banks to reduce their risk-weighted assets, implying a downward shift in lending

[1]See Kashyap et al. (2004), BCBS (2006), Cohen and Scatigna (2016) and Cerutti et al. (2018) among others.

in order to meet the capital requirements. As evidence, the former authors use a Vector Autoregressive (VAR) model to estimate the effect of changes in banks' capital requirements on lending in the United Kingdom (UK) and find that tighter capital requirements are associated with a reduction in lending, with the effect on corporate lending more pronounced relative to household lending.

Earlier work by Aiyar et al. (2016) study the interaction of capital requirements and monetary policy and response of UK banks to the two policies. Their findings show that banks reduce lending in response to tighter capital reforms and monetary policy. They also exploit the heterogeneity of banks and find that large banks react to tighter capital requirements only, while small banks react to both policies. Deli and Hasan (2017) and Mirzaei and Samet (2022) provide cross-country evidence on the effect of macroprudential reforms. The former authors conduct the analysis for banks in 125 countries and find weak negative effects of capital stringency on loan growth, especially for well-capitalized banks. Mirzaei and Samet (2022) find similar results for banks in 91 countries, where small, less-capitalized and less-liquid banks reduce lending more in response to stringent capital requirements relative to banks that are well-capitalized and highly-liquid.

With the use of various Dynamic Stochastic General Equilibrium (DSGE) models, Angelini et al. (2015) find that a one percentage point increase in the capital ratio translates into a 0.09 percent loss in output relative to the level that would have prevailed in the absence of capital tightening. Berka et al. (2018) study the interaction between credit activity, Basel Accords banking regulations, household saving decisions and project returns with the use of a DSGE model, calibrated for the Canadian economy. They find that Basel Accords in the form of capital requirements have an impact on loans, when project returns decline throughout the cycle as the requirements prompt banks to ration credit during downturns where project returns are low, implying increased default risk by borrowers (entrepreneurs).

Interestingly, work on the potential effect of macroprudential reforms in emerging markets is limited. The exception is recent work by Fang et al. (2022) who study the impact of rising capital requirements on lending in Peru. They exploit bank-level lending data and bank-specific capital buffers. Their findings show that higher capital requirements are associated with

lower credit extension. The effects however vary according to economic conditions and bank characteristics, where less capitalized, less liquid and less profitable banks react more to tighter capital requirements. The effects are also more pronounced during economic downturns. In the case of South Africa, earlier work by Maredza (2016) investigates the impact of increased bank requirements and in particular those introduced under Basel II on the cost of intermediation. Results from a panel of ten banks show that tighter capital requirements increase the cost of intermediation, with the net interest margin serving as a proxy for the cost of intermediation. Gumata and Ndou (2017) assess the impact of Basel III in the form of liquidity coverage ratio and net stable funding ratios on credit growth. Their decomposition exercise shows that Basel III contributed to the contraction in credit post the GFC.

Lastly, the construction of our narrative macroprudential reforms is based on the literature documenting narrative methods of identification. As outlined earlier, evidence on the response of bank lending to macroprudential reforms is based on the assumption that an increase in aggregate regulatory capital represents a negative credit supply shock and in turn have a negative effect on credit extension (Noss and Toffano, 2016). As such, our narrative accounts of macroprudential reforms implicitly proxy for credit supply shocks. Ramey (2016) describes the narrative method of identification as constructing a series from historical documents to identify the reason and/or the quantities associated with a particular change in a variable. Furthermore, the construction of narrative accounts is particularly aimed at exclusively isolating shocks or effects of policy intervention(Angelopoulou et al., 2007). Therefore, by constructing a narrative series of macroprudential reforms, we aim to address challenges relating to the identification of macroprudential reforms and their impact thereof. The application of the identification strategy has largely focused on identifying monetary and fiscal shocks[2]. However, the approach is increasingly being applied to analyse and identify capital reforms. For instance, Budnik and Rünstler (2020) analyse the dynamic effects of U.S macroprudential policies by constructing a set of policy measures related to capital requirements following the Basel III Accords. The narrative instruments take a value of -1 and 1 in the case of tightening and easing of capital

[2]See Romer and Romer (1989), Romer and Romer (1997) Romer and Romer (2004) Romer and Romer (2010) Ramey (2011)]Ramey (2016) Ramey and Zubairy (2018).

requirements, respectively and 0 otherwise. Importantly, results from their analysis show that tightening of capital requirements induces a persistent decline in corporate credit. Further, the impact of a change in capital requirements is concentrated more on corporate credit relative to household credit. Eickmeier et al. (2018) also assess the dynamic effects of bank capital regulation in the U.S, where they use the narrative approach to construct an exogenous capital regulation index that captures exogenous changes in bank capital regulation. Their results also show persistent declines in corporate and investment loans and real estate loans, following changes in the capital regulation index.

We therefore add to the growing empirical literature examining; (1) the response of banks to changes in macroprudential reforms; (2) particularly in emerging markets and (3); applying narrative methods of identification.

3 Narrative Indicators

3.1 Macroprudential reforms (kea)

This section presents actions and events we use to construct a set of macroprudential measures or indicators introduced following Basel II Agreements and Accords. The indicators represent credit supply shocks, following Noss and Toffano (2016) and Deli and Hasan (2017) among others. The construction is based on historical documents containing actions and events that lead to the implementation of macroprudential regulations, from 2008 to 2019. We consult circulars issued by the SARB to commercial banks in South Africa, annual reports of commercial banks and SARB and risk and capital management reports of commercial banks. We consider reports of only the big 4 commercial banks in South Africa as they account for over 90 percent of banking industry assets.[3] We also consider documents published and issued by the Basel Committee on Bank Supervision (BCBS), containing communication between BCBS and SARB relating to the implementation of Basel regulations.

Due to the wide variety of information contained in the documents, we impose a criteria with which we use to identify actions and events that are most important in the construction

[3]The big 4 banks include Standard Bank, ABSA, NEDBANK and First Rand.

of our narrative indicators. Since the set of macorprudential indicators proxy for credit shocks, the criteria imposed is such that: (1) actions and events are specific in their intentions and (2), actions and events might imply a change in bank behaviour with respect to the adjustment of capital buffers and/or the attachment of greater risk weights to certain lending products or lending markets. From this, we are able to build a series of two narrative indicators z_t defined such that $z_t = 1$ for dates of events containing announcements and communication of regulation intended to be passed and the drafting of such regulation which we call $Draft$. The second indicator is such that $z_t = 1$ for dates of events recording the eventual implementation of the regulation, which we call $Implementation$. For dates where $Draft$ and $Implementation$ of regulation is not recorded $z_t = 0$. Therefore where possible, we also track the actions and events from the date they are communicated and or announced, issued or published ($Draft$), until the date they are introduced or implemented ($Implementation$).

The decomposition of the actions and events is done with the aim of possibly identifying anticipation effects following the drafting of regulation not yet implemented. For instance, Eickmeier et al. (2018) analyse the macroeconomic effects of bank capital requirement tightenings using a narrative index of bank regulatory capital in the U.S. They find that bank assets (loans) and industrial production fall 6 months before new rules become effective. The anticipation effects are captured by the banks' actions between dates when regulation is first mentioned in proposed rules and dates when the final rule is communicated. In effect, anticipation effects are therefore based on the notion that banks have information on the proposed regulation and dates which they will be implemented and as such, they can act (expand credit for instance) before implementation date and thereby take advantage of less stringent requirements on credit extension due to regulation before tighter requirements are introduced.

Information contained in the documents we use to construct our narrative indicators also contain details enabling us to exploit such anticipation effects.

Importantly, we do not identify the impact of individual regulations and requirements under Basel Accords and Agreements but rather, we consider Basel regulations in their entirety. Although different Basel regulations such as the capital and liquidity requirements target different instruments, the entirety of Basel regulations, which both capital and liquidity requirements

fall under, is aimed at creating resilient and robust banking systems, through higher bank capital requirements and subsequently, increased bank capital holdings (Cohen and Scatigna, 2016) (Cerutti et al., 2018).

As an example to some of the actions we use to construct the two sets of indicators, the implementation of Basel II on January 1, 2008 is categorized as an implementation indicator. Further example occurs on February 4, 2009, which we categorize as a $Draft$ indicator, where the SARB issues directive 1/2009 (1 of 2009) announcing the approach banks should follow in the application of capital floors. "Modelled capital should not be below 80% of the capital requirements under Basel I to ensure capital levels do not fall below prudent level".

Following Basel II, banks are allowed to use internal models to determine risk weights and in turn, determine capital levels. However, capital floors ensure capital requirements did not fall below a certain percentage of banks' capital requirements under the previous Basel I framework(BCBS, 2006). This in essence, imply greater risk weight arched to riskier credit products. For instance, Imbierowicz et al. (2018) show that Danish banks reducing their lending on loans with higher risk weights, in response to higher capital requirements, including approaches to capital floors. A further example which is categorized as a $Draft$ indicator and tracked until implementation, occurs on July 31, 2009, where the BCBS announces "measures to strengthen the 1996 rules governing trading book capital and to enhance the three pillars of the Basel II framework (Basel 2.5)". This in essence, aims to introduce higher capital requirements to capture the credit risk of complex trading activities, promote the build-up of capital buffers that can be drawn down in periods of stress and strengthen the quality of bank capital(BCBS, 2009). The SARB endorsed and gave notices to banks to prepare for the implementation therefore, on October 8, 2010, following the communication by the BCBS on July 31, 2009. Following both communications and announcements, Basel 2.5 is eventually implemented January 1, 2012.

4 Finance regulation reforms (Duma)

5 Data and Methodology

5.1 Data (Duma and Xolani)

Still to come... *It is important to note that policy indicators capturing macroprudential reforms are not-bank specific . For instance, banks in our panel may at their discretion, increase their capital buffers in addition to minimum requirements. However, the minimum macroprudential (predominantly capital requirements) reforms are applied uniformly across banks.*

Table 1: Descriptive Statistics

Series	Median	SD	Min	Max	IQR	Obs
Lending growth						
Three month change in log commercial mortgages to corporates and households	1.16	1.08	-1.43	3.81	1.67	153
Three month change in log household unsecured lending	1.43	2.49	-10.40	10.08	1.78	153
Three month change in log leasing and installments to corporates	1.32	1.48	-1.69	6.82	2.04	153
Three month change in log leasing and installments to households	1.15	1.29	-2.56	4.63	1.54	153
Three month change in log non-financial corporate unsecured lending	1.54	2.85	-9.17	8.04	3.58	153
Three month change in log residential mortgages to households	0.77	0.59	-0.78	2.33	0.73	153
Three month change in log total leasing and installments	1.30	1.12	-1.53	3.58	1.37	153
Three month change in log total mortgage lending	1.01	0.52	-0.11	1.96	0.65	153
Three month change in log total unsecured lending	1.55	2.20	-5.57	7.36	2.68	153
Lending rates						
Commercial mortgages to corporates and households rate	8.06	1.05	6.16	9.99	1.55	156
Household unsecured lending rate	14.17	2.63	4.78	15.67	2.19	156
Leasing and installements to corporate rate	9.40	0.84	7.05	10.46	1.38	156
Leasing and installments to households rate	10.63	0.96	8.85	11.91	2.06	156
Non financial corporate unsecured lending rate	7.26	0.75	6.02	8.48	1.28	156
Residential mortgages to household rate	8.64	1.24	6.78	10.28	2.27	156
Total leasing and installments rate	10.26	0.91	8.29	11.44	1.75	156
Total mortgages lending rate	8.40	1.17	6.59	10.19	1.99	156
Total unsecured lending rate	9.58	1.04	6.30	10.74	1.46	156
Macroprudential regulation narrative indices						
Draft Index	0.00	0.25	0.00	1.00	0.00	156
Implementation Index	0.00	0.27	0.00	1.00	0.00	156
Competition regulation narrative indices						
Finance regulation index	0.00	0.29	0.00	1.00	0.00	156
Financial inclusion index	0.00	0.08	0.00	1.00	0.00	156
Controls						
Consumer confidence index	-8.00	9.85	-33.00	26.00	9.00	156
Repo rate	5.75	1.26	3.50	7.00	2.00	156
SAVIT40 index	18.44	3.62	12.70	37.93	4.92	156

5.2 Methodology (Kea, Duma, Xolani)

The objective of the paper is to evaluate the response by banks to macroprudential reforms and whether the reforms are consistent with policies aimed at enabling competition and inclusion in the banking industry. Therefore, we evaluate specifications relating to macroprudential reforms and specifications relating to competition and inclusion separately,

5.2.1 Response to Macroprudential reforms (Kea)

Our aim in this section is to evaluate the response of credit supply to macroprudeetial reforms. Banks might pass the increase in cost of funding, following tighter macroprudential capital

requirements, on to their borrowers in the form of higher interest rate on loans or by reducing the quantity of credit they can extend (Noss and Toffano, 2016). As such, we consider both the response of stock of outstanding loans and the price of the loans (rates).

Following Aiyar et al. (2016), Deli and Hasan (2017), Fang et al. (2022) and Mirzaei and Samet (2022) the first baseline panel regression model considers the effect of macroprudnetial reforms on the stock of lending as follow:

$$\Delta Loan_{b,i,t+r,t-p} = \beta_0 + \beta_1 MacroPru_t + +\beta_3 X_{b,t-p} + \omega_b + \lambda_t + \epsilon_{i,t} \tag{1}$$

where the dependent variables is loan growth, defined as as the log-difference in the stock of loans of bank b, between the end of month $t = r + r$ and and end of month $t - p$, for lending product i. The main explanatory variable is the macroprudential reform ($MacroPru$) indicator, such that \$MacroPru=1 \$ for dates of events containing announcements and communication of regulation intended to be passed and the drafting of such regulation, $Draft$ and zero otherwise. Similarly, we also estimate equation (1) for \$MacroPru=1 \$ for dates of events recording the eventual implementation of the regulation, $Implementation$ and zero otherwise.

We decompose the stock of loans to nine categories, that is $i = 1...9$, which consist of three totals, defined as total unsecured lending, total mortgage lending, total secured lending. Unsecured lending is defined as loans, overdrafts and credit cards to households and non-financial sector corporates, while secured lending consist of leasing and instalment sales to households and non-financial sector corporates. Total unsecured lending therefore consist of household unsecured lending and non-financial corporate sector lending. Total mortgage lending consist of residential mortgages to households and commercial mortgages to corporates and households.

We include a set of time-varying bank-specific controls, captured by $X_{b,t-p}$, consisting of banks' return on assets and total capital adequacy ratio. Furthermore, we use bank-fixed effects ω_b to absorb differences in unobserved and time-invariant bank characteristics. Macroeconomic and policy shocks affecting banks equally such as economic growth and monetary policy are absorbed by time fixed effects λ_t.

Similarly, the specification for the price of lending follows:

$$P_{b,i} = \beta_0 + \beta_1 MacroPru + \beta_3 X_{b,t-p} + \omega_b + \lambda_t + \epsilon_{i,t} \tag{2}$$

where the dependent variable is bank $b's$ lending rate for product i. The main explanatory variable $MacroPru$, is defined as in equation (1). The controls are also as in equation(1).

5.2.2 Response to financial inclusion events (Duma)

The second baseline panel regression considers the response of banks to events aimed at enabling financial inclusion in the banking industry. We firstly consider the effect of the events on the stock of lending as follow:

$$\Delta Loan_{b,i,t+r,t-p} = \beta_0 + \beta_1 Inclusion + \beta_2 D_t + \beta_3 X_{b,t-p} + \omega_b + \lambda_t + \epsilon_{i,t} \tag{3}$$

where the dependent variables is loan growth, defined as as the log-difference in the stock of loans of bank b, between the end of month $t = r + r$ and and end of month $t - p$, for lending product i. We consider only three loan categories: Total unsecured lending, secured lending and total mortgage lending. The definitions are as in the previous section. $Inclusion$ is a dummy variable, such that $Inclusion = 1$ for dates of events where measures aimed at enabling financial inclusion are announced, drafted and implemented.

We also include a set of macro controls which include the repo rate, consumer confidence index and SAVIT40 index and bank-specific control, return on assets. These are captured by $X_{b,t-p}$. We also control for the COVID-19 period, captured by the dummy D_t such $D_t = 1$ from the beginning of the lockdown period until the end of the sample and 0 otherwise. As with macroprudential specifications, we include bank-fixed effects ω_b time fixed effects λ_t.

We also evaluate the effect of the reforms on lending rates. The specification is as follow:

$$P_{b,i} = \beta_0 + \beta_1 Inclusion + beta_2 D_t + \beta_3 X_{b,t-p} + \omega_b + \lambda_t + \epsilon_{i,t} \tag{4}$$

where the dependent variable is bank $b's$ lending rate for product i. We consider lending

rates on total unsecured lending, secured lending and total mortgage lending. *Inclusion*, D_t and $X_{b,t-p}$ are defined as in equation (3). Bank-fixed effects are captured by ω_b, while λ_t represent time fixed effects.

Still need to define equation 5 below

$$P_{b,i} = \beta_0 + \beta_1 MicroReg + \beta_2 D_t + \beta_3 X_{b,t-p} + \omega_b + \lambda_t + \epsilon_{i,t} \tag{5}$$

6 Results

6.1 Response to macroprudential regulation (Kea)

Banks might pass the increase in cost of funding, following tighter macroprudential capital requirements, on to their borrowers in the form of higher interest rate on loans or by reducing the quantity of credit they can extend (Noss and Toffano, 2016)

Two possibilities for positive coefficients on lending volumes. One is the the anticipation effects where banks have information on the proposed regulation and dates which they will be implemented and as such, they can act (expand credit for instance) before implementation date and thereby take advantage of less stringent requirements on credit extension due to regulation before tighter requirements are introduced.

Secondly, and with positive coefficients with implementation is the idea of portfolio rebalancing. The notion is that banks will reduce their relatively riskier loan portfolio (e.g reduction in unsecured lending) and rebalance their portfolios towards more prudent ones (secured loan portfolio) (Deli and Hasan, 2017). This is due to fact that macroprudential reforms enforce banks to attach greater risk weights to certain loan portfolios such as unsecured credit. For instance, banks in Denmark retrenched more on their lending portfolio with higher risk weights, in response to higher capital requirements (Imbierowicz et al., 2018).

Similarly, Cappelletti et al. (2019) find that banks classified as Other Systematically-Important (O-SII), who face added capital requirements, reduce their credit supply to households and financial sectors and shifted their lending to less risky counterparts within the non-financial corporations sector.

Similarly, the banks in our sample (FNB, Standard Bank, Nedbank and ABSA) are classified as Domestic-Systematically Important Banks (D-SIB) and are charged additional capital requirements}.

Table 2: Macroprudential regulations and lending volumes (3-months) results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgages	Unsecured	Secured	Mortgages	Unsecured	Secured	Mortgages
				Draft model					
Draft index	0.624	2.232**	-0.194***	0.414	0.890**	-0.405**	0.999**	3.109**	-0.156
				Implementation model					
Implementation index	1.82***	0.51	-0.62**	2.33***	1.24*	-1.44**	0.62	-0.09	-0.27*
Num.Obs.	580	580	580	580	580	580	580	580	580
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table 3: Macroprudential regulation and lending rates

	Total			Corporates			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Draft model					
Draft index	0.376***	-0.387***	-0.495***	0.307***	-0.449***	-0.198	0.387**	-0.359***	-0.597***
				Implementation model					
Implementation index	2.59***	-0.51***	-0.61**	2.30**	-0.73***	-0.77**	3.04***	-0.41***	-0.58**
Num.Obs.	580	580	580	580	580	580	580	580	580
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

6.2 Financial regulation and inclusion (Duma)

6.3 Robustness (Kea and Duma)

6.4 Discussion (???)

7 Conclusion (Kea and Duma)

Table 4: Finance regulation and lending volumes (3-months) results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Finance regulation model					
Finance regulation index	-1.207***	0.027	-0.072	-1.743***	0.770***	-0.412	-0.022	-0.424	0.011
Covid-dummy	-0.655**	-0.569	0.176	-0.212	0.295	-0.481	-1.525***	-1.095	0.548*
				Financial inclusion model					
Financial inclusion index	-4.25***	-1.60	-0.45*	-6.92***	-2.11***	-2.91	1.44***	-1.36	0.34
Covid-dummy	-0.48*	-0.53	0.19	0.05	0.31*	-0.39	-1.56***	-1.04	0.54
Num.Obs.	768	768	768	768	768	768	768	768	768
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table 5: Financial regulation and lending rates results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Finance regulation model					
Finance regulation index	0.992***	-0.181*	-0.308*	0.842**	-0.205	-0.376**	1.201***	-0.159*	-0.293*
Covid-dummy	-0.615**	-1.576***	-1.869***	-0.389	-1.762***	-1.489**	-1.291**	-1.549***	-1.948***
				Financial inclusion model					
Financial inclusion index	-0.30***	0.21	-0.63***	-0.35**	0.63	-0.87***	-0.27***	0.03	-0.53***
Covid-dummy	-0.66**	-1.57***	-1.84***	-0.43*	-1.77***	-1.45**	-1.35***	-1.54***	-1.92***
Num.Obs.	768	768	768	768	768	768	768	768	768
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
* p < 0.1, ** p < 0.05, *** p < 0.01									

8 References

Aiyar, S., Calomiris, C. W., and Wieladek, T. (2016). How does credit supply respond to monetary policy and bank minimum capital requirements? *European Economic Review*, 82:142–165.

Angelini, P., Clerc, L., Cúrdia, V., Gambacorta, L., Gerali, A., Locarno, A., Motto, R., Roeger, W., Van den Heuvel, S., and Vlček, J. (2015). B asel iii: Long-term impact on economic performance and fluctuations. *The Manchester School*, 83(2):217–251.

Angelopoulou, E. et al. (2007). The narrative approach for the identification of monetary policy shocks in a small open economy. *Bank of Greece, Working Paper No*, 55.

BCBS (2006). International convergence of capital measurement and capital standard. Report P-41, Bank for International Settlements.

BCBS (2009). Revisions to the basel ii market risk framework. Report P-41, Bank for International Settlements.

Berka, M., Zimmermann, C., et al. (2018). Basel accord and financial intermediation: the impact of policy. *Federal Reserve Bank of St. Louis Review*, 100(2):171–200.

Budnik, K. and Rünstler, G. (2020). Identifying svars from sparse narrative instruments: Dynamic effects of us macroprudential policies. Technical report, Europen Central Bank.

Cappelletti, G., Marques, A., Varraso, P., Budrys, Ž., and Peeters, J. (2019). Impact of higher capital buffers on banks' lending and risk-taking: evidence from the euro area experiments. Technical report, European Central Bank.

Cerutti, E., Correa, R., Fiorentino, E., and Segalla, E. (2018). Changes in prudential policy instruments-a new cross-country database. *48th issue (March 2017) of the International Journal of Central Banking*.

Cohen, B. H. and Scatigna, M. (2016). Banks and capital requirements: channels of adjustment. *Journal of Banking & Finance*, 69:S56–S69.

Deli, Y. D. and Hasan, I. (2017). Real effects of bank capital regulations: Global evidence. *Journal of Banking & Finance*, 82:217–228.

Eickmeier, S., Kolb, B., and Prieto, E. (2018). The macroeconomic effects of bank capital requirement tightenings: Evidence from a narrative approach. Technical report, Australian National University.

Fang, X., Jutrsa, D., Peria, S. M., Presbitero, A. F., and Ratnovski, L. (2022). Bank capital requirements and lending in emerging markets: The role of bank characteristics and economic conditions. *Journal of Banking & Finance*, 135:105806.

Gumata, N. and Ndou, E. (2017). *Bank credit extension and real economic activity in South Africa: The impact of capital flow dynamics, bank regulation and selected macro-prudential tools*. Springer.

Imbierowicz, B., Kragh, J., and Rangvid, J. (2018). Time-varying capital requirements and disclosure rules: Effects on capitalization and lending decisions. *Journal of Money, Credit and Banking*, 50(4):573–602.

Kashyap, A. K., Stein, J. C., et al. (2004). Cyclical implications of the basel ii capital standards. *Economic Perspectives-Federal Reserve Bank Of Chicago*, 28(1):18–33.

Maredza, A. (2016). Do capital requirements affect cost of intermediation? evidence from a panel of south african banks. *The Journal of Developing Areas*, pages 35–51.

Mirzaei, A. and Samet, A. (2022). Effectiveness of macroprudential policies: Do stringent bank regulation and supervision matter? *International Review of Economics & Finance*, 80:342–360.

Noss, J. and Toffano, P. (2016). Estimating the impact of changes in aggregate bank capital requirements on lending and growth during an upswing. *Journal of Banking & Finance*, 62:15–27.

Ramey, V. A. (2011). Identifying government spending shocks: It's all in the timing. *The Quarterly Journal of Economics*, 126(1):1–50.

Ramey, V. A. (2016). Macroeconomic shocks and their propagation. *Handbook of macroeconomics*, 2:71–162.

Ramey, V. A. and Zubairy, S. (2018). Government spending multipliers in good times and in bad: evidence from us historical data. *Journal of political economy*, 126(2):850–901.

Romer, C. D. and Romer, D. H. (1989). Does monetary policy matter? a new test in the spirit of friedman and schwartz. *NBER macroeconomics annual*, 4:121–170.

Romer, C. D. and Romer, D. H. (1997). Identification and the narrative approach: A reply to leeper. *Journal of Monetary Economics*, 40(3):659–665.

Romer, C. D. and Romer, D. H. (2004). A new measure of monetary shocks: Derivation and implications. *American Economic Review*, 94(4):1055–1084.

Romer, C. D. and Romer, D. H. (2010). The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks. *American Economic Review*, 100(3):763–801.

A Appendix

A.1 Data sources

Table A1: Data Sources

	Description	Availability	Source
Macroprudential narrative index	Narrative index of macroprudential regulations in South Africa.	Public data	Own analysis
Competition narrative index	Narrative index of financial regulations in South Africa	Public data	Own analysis
BA900	Banking sector balance sheet data at a bank level	Public data	South African Reserve Bank
BA930	Banking sector lending rates at a bank level	Aggregated data is public. Bank specific data is private	South African Reserve Bank
Controls	Banking sector performance data at a bank level and general macroeconomic data.	Aggregated data is public. Bank specific data is private	Prudential Authority, South African Reserve Bank, Statistics South Africa, Johanesburg Stock Exchange

A.2 Aggregation scheme

Table A2: Aggregation schema

BA 900 Categories	Item Number	Sector	Aggregation Key
Installment sales	141	Financial corporate sector	-
	142	Non financial corporate sector	g
	143	Household sector	h
	144	Other	-
Leasing transactions	146	Financial corporate sector	-
	147	Non financial corporate sector	g
	148	Household sector	h
	149	Other	-
Farm mortgages	152	Non financial corporate sector	d
	153	Household sector	d
	154	Other	-
Residential mortgages	156	Non financial corporate sector	e
	157	Household sector	-
	158	Other	-
Commercial and other mortgages	160	Public financial corporates	-
	161	Public non-financial corporates	-
	162	Private financial corporate	d
	163	Private non-financial corporates	d
	164	Household sector	-
	165	Other	-
Credit cards	167	Financial corporate sector	a
	168	Non financial corporate sector	b
	169	Household sector	-
	170	Other	-
Overdrafts	178	Public sector (includes public corporations and local government)	-
	181	Financial corporate sector	-
	182	Non financial corporate sector	-
	183	Unincorporated business enterprises	a
	184	Other Household sector	-
	185	Non-profit organisations serving households	b
Factoring debtors	187		-
Other loans and advances	189	Financial corporate sector	-
	190	Non financial corporate sector	a
	191	Unincorporated business enterprises	-
	192	Other Household sector	b
	193	Non-profit organisations serving households	-

The following aggregation scheme which results in nine categories was followed based on

Table A2:

a. Non-financial corporate unsecured lending: Items 168 + 183 + 190
b. Household unsecured lending: Items 169 + 185 + 192

c. Total unsecured lending: Non-financial corporate unsecured lending + Household unsecured lending
d. Commercial mortgages to corporates and households: Items 152 + 153 + 156 + 163 + 164

e. Residential mortgages to household: Item 157
f. Total mortgage lending: Commercial mortgages to corporates and households + Residential mortgages to household
g. Leasing and instalments to corporates: Items 142 + 147
h. Leasing and instalments to households: Items 143 + 148
i. Total leasing and instalments: Leasing and instalments to corporates + Leasing and instalments to households

A.3 Bank lending rates weighting scheme

The loans quantities from the BA900s are then linked to the lending rate data from the BA930s using table to create nine lending rate categories the schema on Table A3. The weights for each category are then calculated by dividing the total value of the loans in each category by the total value of all loans in the BA900s. The weights are then used to calculate the weighted average lending rate for each month. The weighted average lending rate is calculated by multiplying the lending rate for each category by the weight for that category and then summing the results.

Table A3: Weighting schema

Sector	BA 930 Categories	Item Number	Weighting Key
Corporate sector	Overdraft rate	48	a and c
	Instalment sale agreements flexible rate	49	g and i
	Instalment sale fixed rate	50	-
	Leasing transactions flexible rate	51	g and i
	Leasing transactions fixed rate	52	-
	Mortgage advances flexible rate	53	d and f
	Mortgage advances fixed rate	54	-
	Credit card rate	55	a and c
	Other	56	a and c
Household sector	Overdraft rate	58	b and c
	Instalment sale agreements flexible rate	59	h and i
	Instalment sale fixed rate	60	-
	Leasing transactions flexible rate	61	h and i
	Leasing transactions fixed rate	62	-
	Mortgage advances flexible rate	63	e and f
	Mortgage advances fixed rate	64	-
	Credit card rate	65	b and c
	Other	66	b and c

The nine categories, therefore, are as follows:

a. Non-financial corporate unsecured lending: Weighted average of items 55 + 48 + 56
b. Household unsecured lending: Weighted average of items 65 + 58 + 66
c. Total unsecured lending: Weighted average of items 55 + 48 + 56 + 65 + 58 + 66
d. Commercial mortgages to corporates and households: Weighted average of items 53
e. Residential mortgages to household: Item 63
f. Total mortgage lending: Weighted average of items 53 + 63

g. Leasing and instalments to corporates: Weighted average of items 49 + 51

h. Leasing and instalments to households: Weighted average of items 59 + 61

i. Total leasing and instalments: Weighted average of items 49 + 51 + 59 + 61

A.4 Aggregated bank lending

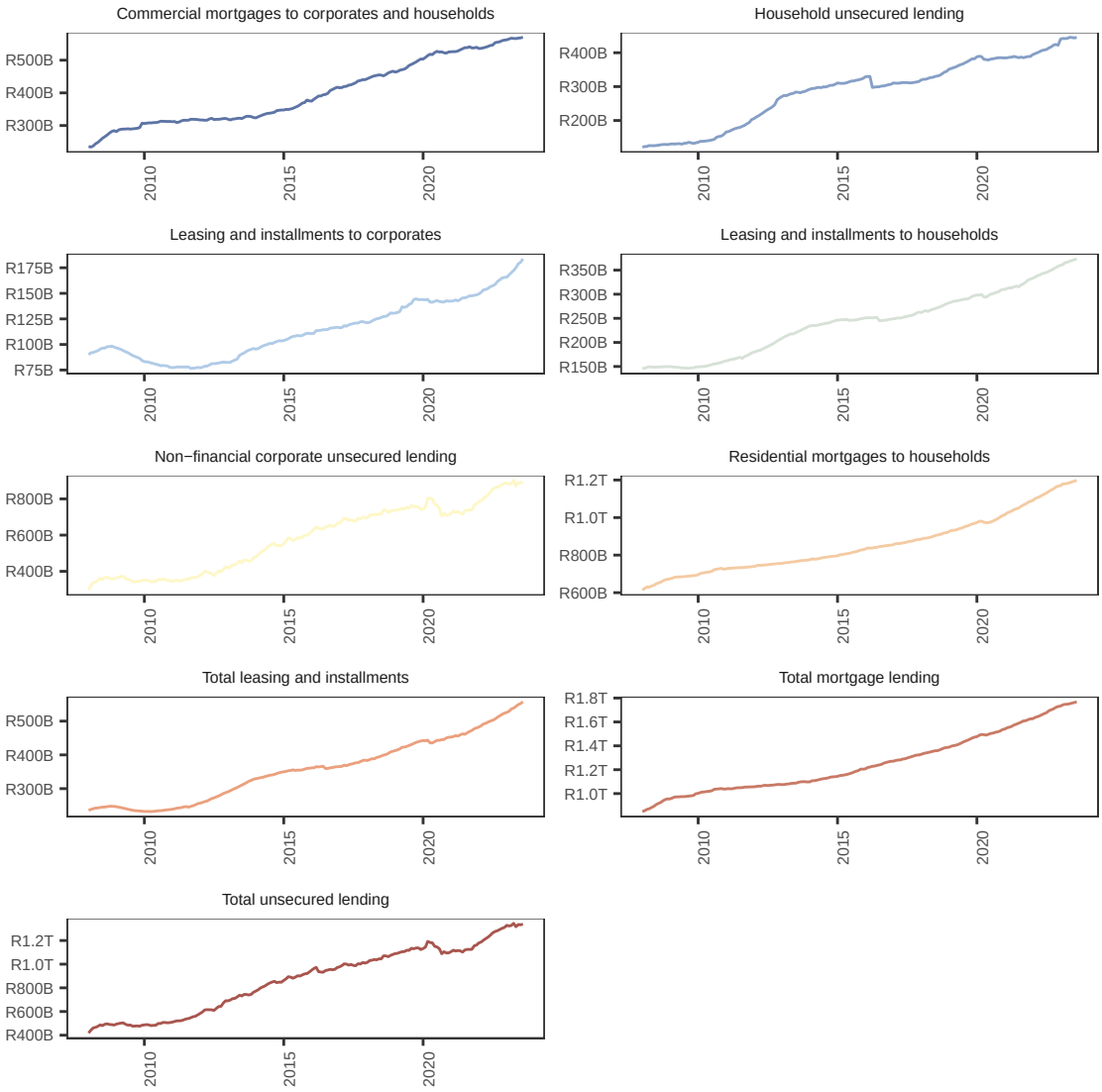

Figure A1: Total aggregated bank lending

A.5 Weighted lending rates (aggregated)

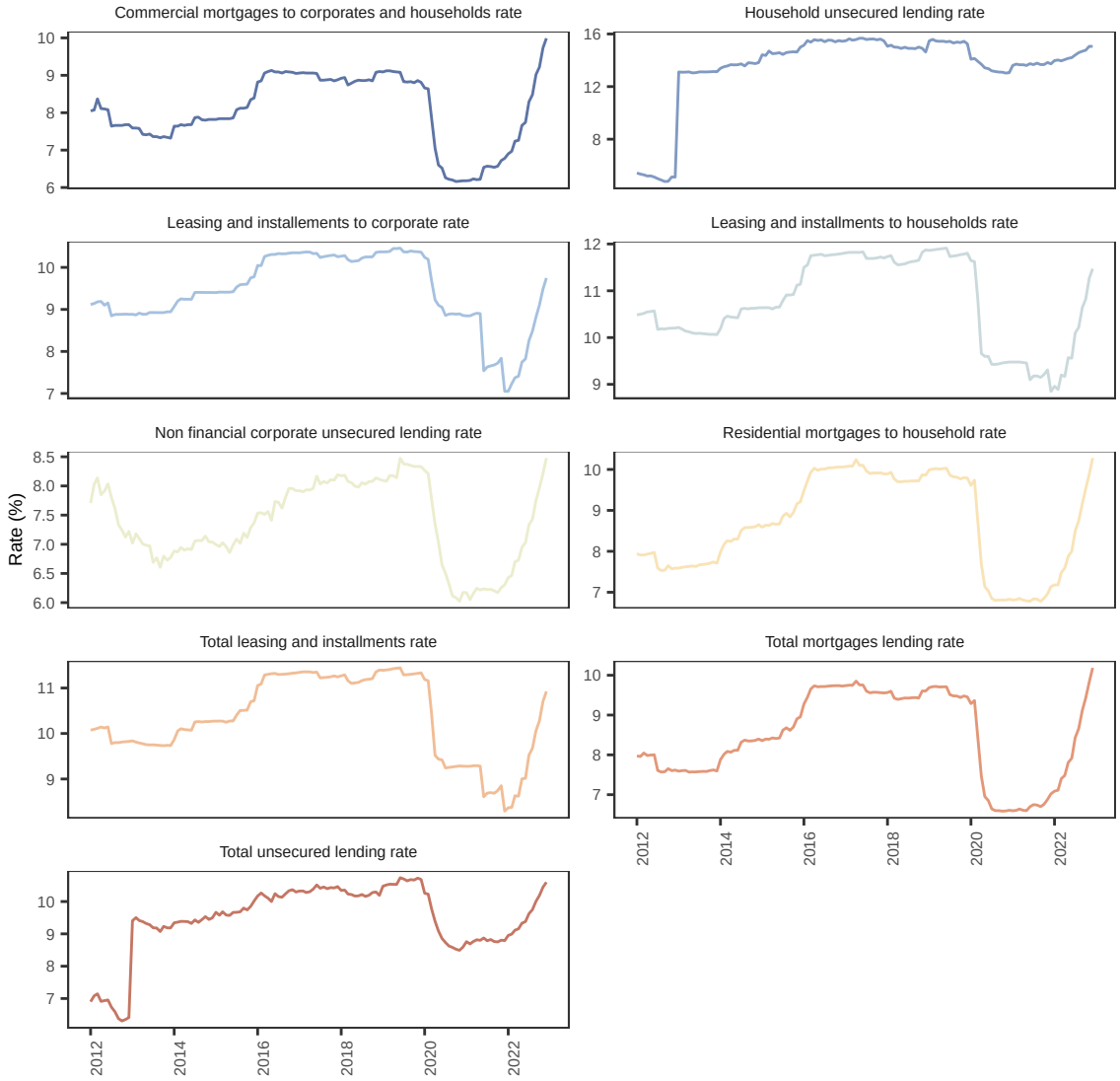

Figure A2: Weighted lending rates

A.6 Description of narrative events

A.6.1 Macroprudential Indicators

This section provides a detailed account of the narrative macroprudential indicators.

2008/01/01: Implementation

BASEL II is Implemented until Dec 2011

2009/02/04: Announcement, draft and passing of regulation

SARB issues **directive 1/2009 (1 of 2009)** announcing the approach banks should follow in the application of capital floors. "Modelled capital should not be below 80% of the capital requirements under Basel I to ensure capital levels do not fall below prudent level". Following Basel II, banks are allowed to use internal models to determine risk weights and in turn, determine capital levels. However, capital floors ensure capital requirements did not fall below a certain percentage of banks' capital requirements under the previous Basel I framework(BCBS, 2006). This in essence, imply greater risk weight arched to riskier credit products. For instance, Imbierowicz et al. (2018) show that Danish banks reducing their lending on loans with higher risk weights, in response to higher capital requirements, including approaches to capital floors.

2009/07/31*: Announcement, draft and passing of regulation

BCBS announces "measures to strengthen the 1996 rules governing trading book capital and to enhance the three pillars of the Basel II framework (Basel 2.5)". This in essence, aims to introduce higher capital requirements to capture the credit risk of complex trading activities, promote the build-up of capital buffers that can be drawn down in periods of stress and strengthen the quality of bank capital(BCBS, 2009)

2010/10/08*: Announcement, draft and passing of regulation

SARB issues **circular 3/2010** endorsing and giving notices to banks to prepare for the implementation of Basel 2.5, following the communication by the BCBS on July 31, 2009

2011/06/30*: Announcement, draft and passing of regulation

BCBS issues and publishes Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems. ???

2011/07/31: Announcement, draft and passing of regulation

Cabinet adopts proposal to shift to Twin Peaks Model of Financial Regulation in South Africa, following he GFC, with the aim of improving institutional structure to support financial regulation. Stricter oversight on finacial system, implications for financial inculsion??

2011/10/31: Announcement, draft and passing of regulation

Basel 2.5 is transposed into domestic law (next step is implementation)

2012/01/01: Implementation

Basel 2.5 takes effect: SARB minimum capital requirements

- Total CET1, 5.25%, Total Tier1, 7%, Minimum regulatory capital, 8%, Total regulatory capital for D-SIB, 9.5%

2012/02/16*: Announcement, draft and passing of regulation

SARB issues **guidance note 2/2012** announcing on new definition of total regulatory capital for Basel III such as:

- Phasing out arrangements for non-common equity Tier 1 capital instruments that no longer qualify as regulatory capital under Basel III
- Transitional arrangements for Basel III implementation

- Treatment of disclosed reserves undrer Basel III

2012/05/31*: Announcement, draft and passing of regulation

SARB issues **guidance Note G5/2012** announcing that it will provide liquidity facility to assist banks in meeting the liquidity Coverage Ratio (LCR) and cash reserves can be included as banks' high quality liquid assets for calculating LCR. This follows results from the QIS exercises by banks, which revealed some banks would have shortfalls of around R140 billion in meeting the 100 LCR by 1 Jan 2019 due do to reliance eon short-term funding limited availability of HQLA

- LCR requirements will be introduced on **1 Jan 2015** at 60%, increasing by 10% to reach 100% on 1 Jan 2019
- Level 1 assets (stocks, funds or bonds) shall comprise 60% of total HQLA while level 2 assets (less liquid) shall constitute no more than the remaining 40%
- SARB proposes that Leverage ratio be set at 4% (LR of 4% implies that banks' leverage does not exceed its capital by 40%)

2012/08/15*: Announcement, draft and passing of regulation

SARB transposes Basel III into law and publishes Counter-cyclical Capital Buffer (CCyB) rules, set to be implemented on 1 January 2016

2013/01/31/*: Implementation

Basel III takes effect

2013/08/20: Announcement, draft and passing of regulation

SARB issues **Guidance Note 6/2013** announcing that banks' cash reserves may be included as part of their level 1 HQLA. Only equities listed on JSE's main exchange and included on Top 40 Index shall be considered as level2 HQLA (*Potentially limit banks' ability to raise capital*).

2014/01/31: Implementation

SARB mimimum Capital Requirements increase to:
Total CET1, 5,5%, Total Tier1, 7%, Total regulatory capital, 8%, Total regulatory capital for D-SIB, 10%

2014/12/31: Announcement, draft and passing of regulation

SARB issues **guidance note 8/2014** announcing the provision of a committed liquidity facility (CLF). This is to assist banks to meet the LCR. Banks, however need to have collateral to access the CLF, consisting of:

- High-quality residential mortgage loans
- Other loans and advances such as VAF, excluding unsecured loans
- Domestically listed securities

Banks with less diversified asset portfolio, i.e small banks will probably not qualify? Further restrictions/ stricter measures to loan extension?

2015/01/31*: Implementation

LCR ratio is introduced/impelemnted at 60% compliance

2015/12/31*: Announcement, draft and passing of regulation

SARB issues **circular 8/2015** announcing timelines and targets in respect of the implementation of the countercyclical capital buffer (CCyB). SARB requirements shall apply to bank-wide total RWA:

- 0.625% on 1 Jan 2016
- 1.25% 1 Jan 2017
- 1.875% on 1 Jan 2018
- 2.5% on 1 Jan 2019

2016/01/31*: Implementation

LCR ratio is introduced/implemented at 60% compliance. CCyB also implemented at 0.625%

2016/04/13*: Announcement, draft and passing of regulation

SARB issues **directive 1/2016** to inform all banks of matters related to the exposure limits imposed in the classification of deposits and credit exposures to small and medium enterprises (SMEs), to be implemented on 1 July 2016. For instance, total exposure of a bank to an SME borrower, which shall be determined or calculated on a consolidated basis, at no time exceeds R12,5 million (*Greater limits on value of a loan that can be extended to an SME and in turn, financial exclusion?*)

2016/07/01*: Implementation

Exposure limits imposed in the classification of deposits and credit exposures to small and medium enterprises (SMEs), announced on 2016/04/13, implemented

2017/01/31*: Implementation

LCR ratio is introduced/implemented at 80% compliance, while CCyB increases to 1.25%

2017/12/13*: Announcement, draft and passing of regulation

SARB issues **directive 8/2017** informing banks to comply with NSFR framework and on matters retaled to calibration of NSFR, including template to monitor NSFR compliance. Agrees to start implementation on 1 January 2018. Objective is to reduce funding risk over a longer time horizon by requiring banks to fund their activities with sufficiently stable sources of funding in order to mitigate the risk of future funding stress. *anks will be required to match their funding with their*

outflows, which may lead to a greater demand for longer term funding. Longer term funding will result in an increased cost of funding for banks (possibly passed on to borrowers and lower profitability and returns for banks

2018/01/31*: Implementation

NSFR Implemented following Directive 8/2017, CCyB increases to 1,875% and LCR is implemented at 90% compliance.

2019/01/31*: Implementation

CCyB increases to 2,5% (maximum) and LCR is implemented at 100% compliance.

A.7 Macroprudential narrative indexes

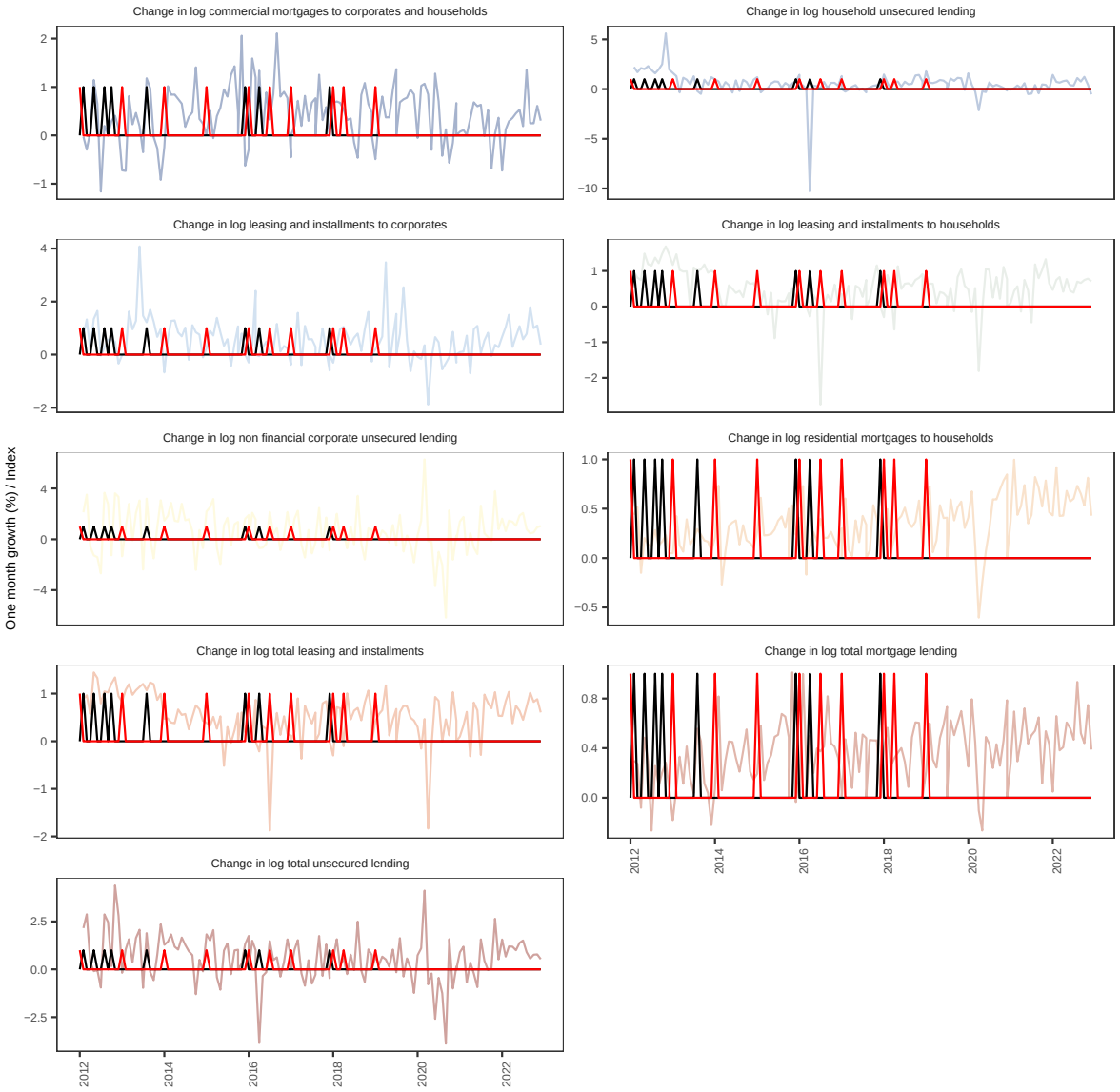

Figure A3: One month lending growth and macroprudential narrative index comparison. Note: The black line represents the Draft index, and the red line represents the Implementation index.

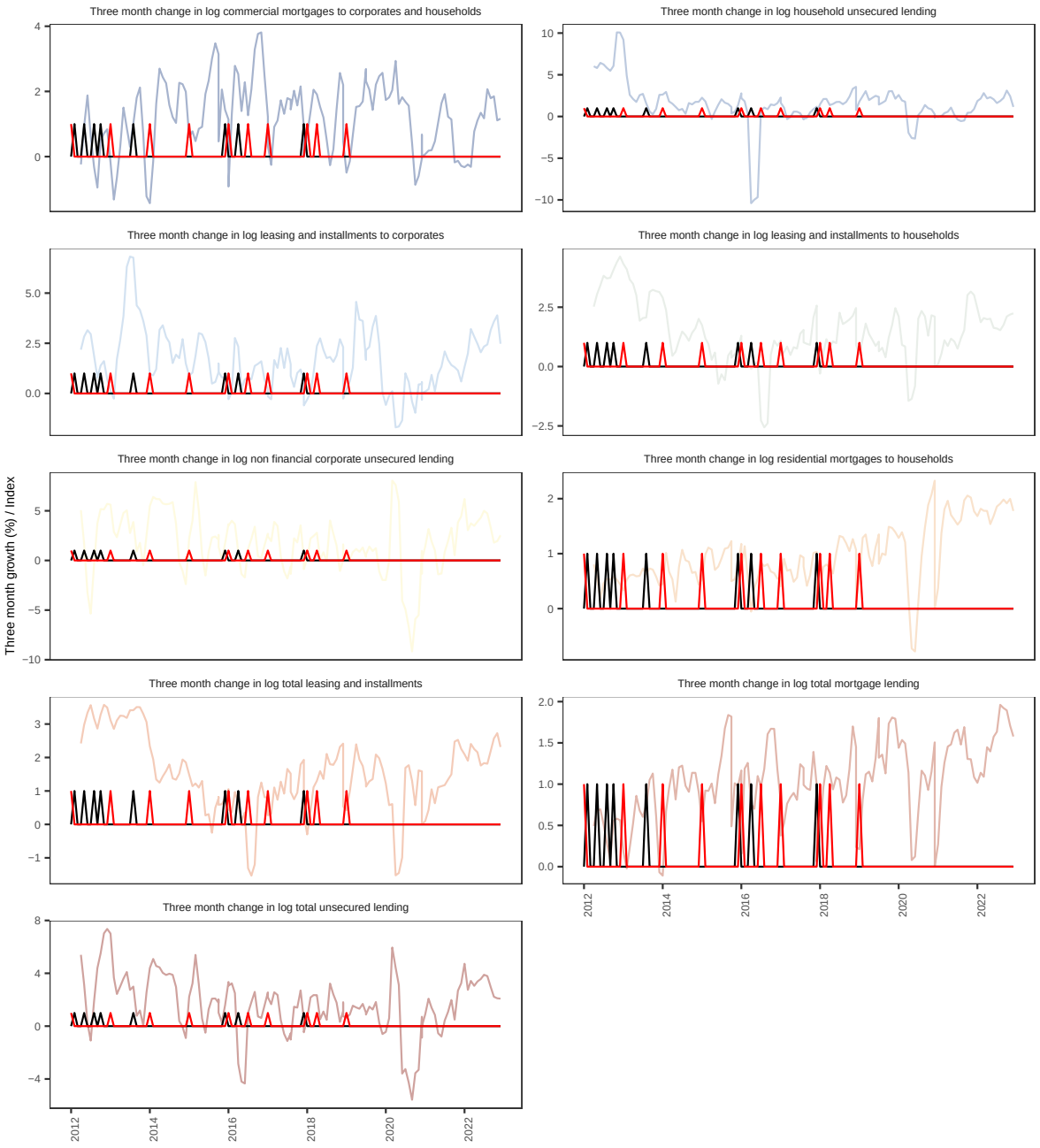

Figure A4: Three month lending growth and macroprudential narrative indexes comparison. Note: The black line represents the Draft index, and the red line represents the Implementation index.

A.8 Financial regulation narrative indexes

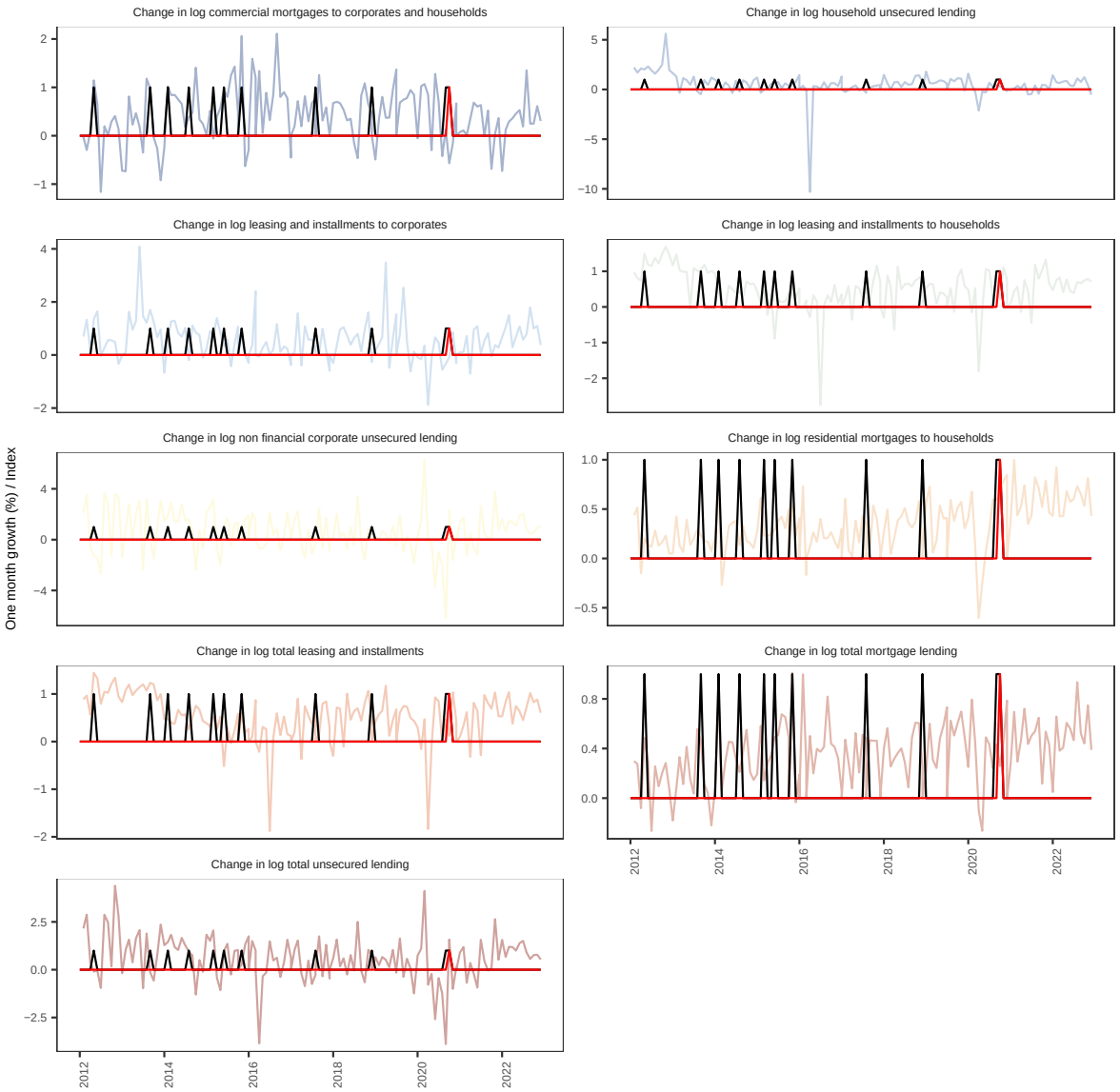

Figure A5: One month lending growth and financial narrative index comparison. Note: The black line represents the Financial regulation index, and the red line represents the Financial inclusion index.

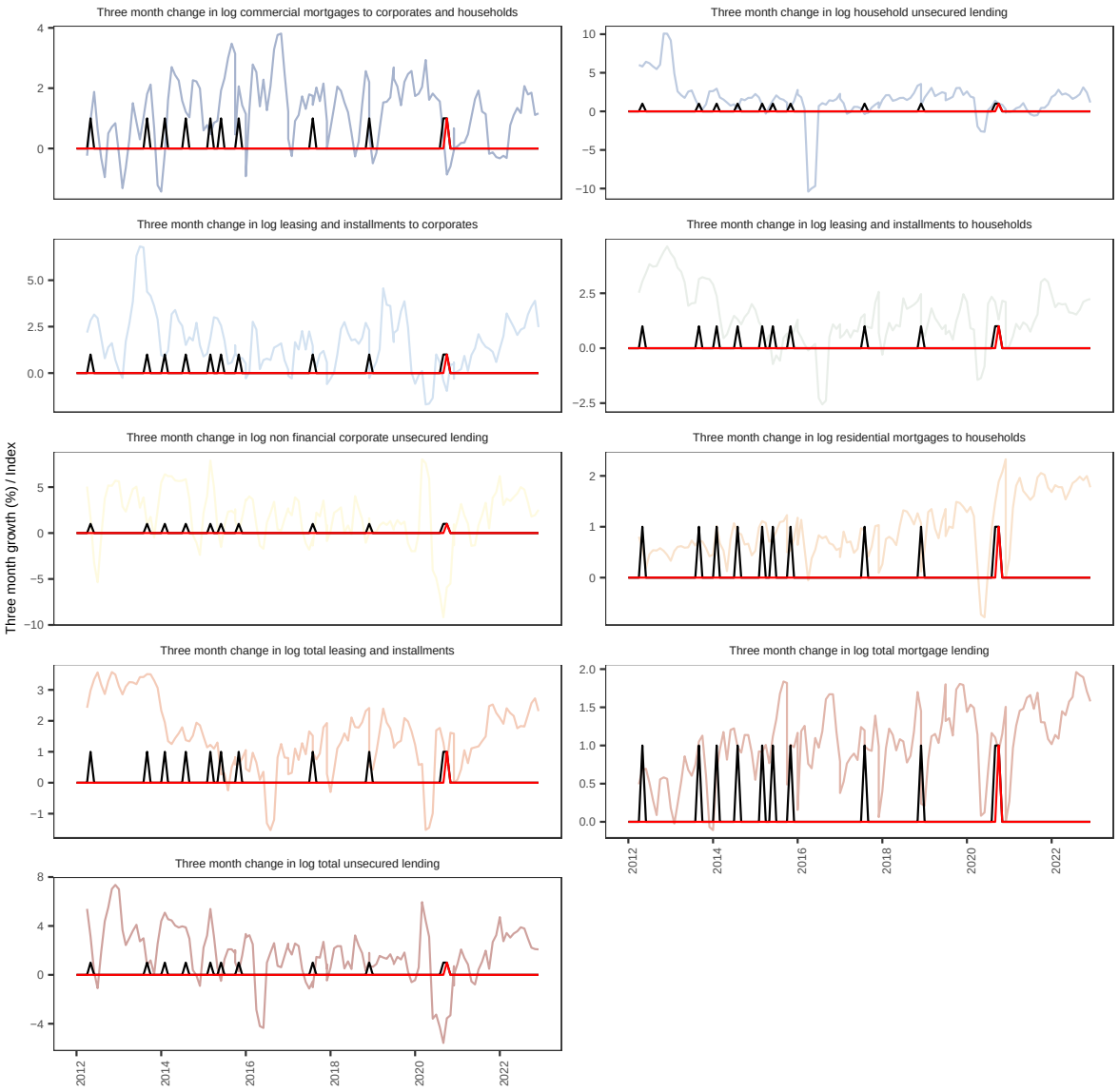

Figure A6: Three month lending growth and financial narrative indexes comparison. Note: The black line represents the Financial regulation index, and the red line represents the Financial inclusion index.

A.9 Results with controls

Table A4: Macroprudential regulations and lending volumes (3-months) with controls results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgages	Unsecured	Secured	Mortgages	Unsecured	Secured	Mortgages
				Draft model					
Draft index	0.641	2.279**	-0.186**	0.423	0.891***	-0.375	1.035**	3.183*	-0.154
Return on assets	1.050	-4.139	-0.867	1.497	2.504**	-2.102	-0.613	-7.865	-0.332
Total capital adequacy ratio	0.233	0.278	0.035	0.185	0.141	0.201	0.352	0.362	0.001
				Implementation model					
Implementation index	1.52***	1.19	-0.49**	1.98***	0.69	-1.18**	0.55	1.29	-0.21*
Return on assets	0.87	-4.26	-0.81	1.26	2.43*	-1.96	-0.67	-7.98	-0.31
Total capital adequacy ratio	0.21	0.25	0.04	0.16	0.13	0.22	0.34	0.33	0.00
Num.Obs.	580	580	580	580	580	580	580	580	580
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table A5: Macroprudential regulation and lending rates with controls results

	Total			Corporations			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Draft model					
Draft index	0.413**	-0.378***	-0.472***	0.360	-0.441***	-0.181	0.393**	-0.350***	-0.570***
Return on assets	5.845***	-0.791**	-1.211	5.153***	-1.073	-1.124	6.015***	-0.643***	-1.281
Total capital adequacy ratio	0.714***	0.050	0.178	0.840**	0.030	0.118	0.391**	0.057	0.209
				Implementation model					
Implementation index	1.05***	-0.40***	-0.49***	0.80	-0.56***	-0.64***	1.67***	-0.33*	-0.47***
Return on assets	5.72***	-0.75*	-1.16	5.06***	-1.01	-1.05	5.82***	-0.61*	-1.23
Total capital adequacy ratio	0.70**	0.06	0.19	0.83**	0.04	0.13	0.37**	0.06	0.22
Num.Obs.	580	580	580	580	580	580	580	580	580
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table A6: Finance regulation and lending volumes (3-months) with controls results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Finance regulation model					
Finance regulation index	-1.724***	0.017	0.003	-2.337***	-0.156	-0.372	-0.287**	0.067	0.113***
Covid-dummy	-1.617	-1.807*	0.998*	-0.242	-1.855***	0.851	-4.650***	-1.939	1.433**
Repo rate	-0.912**	-0.786***	0.310*	-0.821	-0.742***	0.836**	-1.063***	-0.920**	0.228
Consumer confidence	0.022*	0.019	0.005	0.016	0.007*	-0.002	0.038***	0.031	0.012***
Return on assets	-1.154**	0.926***	0.791***	-1.528**	1.631***	2.041***	-0.288	0.689**	0.403*
SAVIT40 index	-0.999***	0.012***	0.037***	-0.995***	0.626***	0.932***	-1.150***	-0.299***	-0.279***
				Financial inclusion model					
Financial inclusion index	-4.29***	-0.84	-0.29	-6.66***	-1.88**	-2.90*	0.66	-0.32	0.59*
Covid-dummy	-1.22	-1.82*	1.00**	0.29	-1.83***	0.93	-4.58***	-1.96	1.41**
Repo rate	-0.87**	-0.79***	0.31**	-0.76	-0.74***	0.84**	-1.05**	-0.92**	0.23
Consumer confidence	0.03**	0.02	0.01	0.02	0.01**	0.00	0.04***	0.03	0.01***
Return on assets	-1.33**	0.93***	0.79***	-1.77**	1.62***	2.01***	-0.33	0.70**	0.41**
SAVIT40 index	-1.33***	0.01***	0.04***	-1.45***	0.58***	0.84***	-1.19***	-0.29***	-0.26***
Num.Obs.	612	612	612	612	612	612	612	612	612
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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

Table A7: Finance regulation and lending rates with controls results

	Total			Corporates			Households		
	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage	Unsecured	Secured	Mortgage
				Finance regulation model					
Finance regulation index	-0.010	0.036*	-0.003	-0.004	0.075*	-0.085	-0.018	0.029*	0.025*
Covid-dummy	-0.431	-0.266	0.851***	0.274	-0.691	0.793*	-1.693**	-0.090	0.906***
Repo rate	0.438*	0.780***	1.080***	0.563**	0.796***	0.576*	0.553***	0.775***	1.258***
Consumer confidence	0.007***	0.003	0.004***	0.010***	0.000	0.011	0.003	0.005***	0.002***
Return on assets	0.099	0.101	0.052*	0.034	0.095	0.004	0.273***	0.105*	0.076**
SAVIT40 index	0.171***	0.141***	0.064***	0.146***	0.232***	0.036***	0.144***	0.118***	0.071***
				Financial inclusion model					
Financial inclusion index	0.11	0.30**	0.04	0.13	0.57*	-0.16	-0.11	0.20***	0.10***
Covid-dummy	-0.43	-0.27	0.85***	0.28	-0.71	0.81*	-1.69*	-0.10	0.90***
Repo rate	0.44*	0.78***	1.08***	0.56**	0.80***	0.58*	0.55***	0.77***	1.26***
Consumer confidence	0.01***	0.00	0.00***	0.01***	0.00	0.01	0.00	0.00***	0.00***
Return on assets	0.10	0.10	0.05*	0.03	0.10	-0.01	0.27***	0.11*	0.08**
SAVIT40 index	0.17***	0.15***	0.06***	0.15***	0.25***	0.02***	0.14***	0.12***	0.08***
Num.Obs.	612	612	612	612	612	612	612	612	612
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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