

# The Impact of Macroprudential Policy Instruments on Financial Stability in Southern Europe<sup>1</sup>

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## Abstract

This paper is a contribution to the body of research examining the impact of macroprudential policy instruments on financial stability. The following hypothesis was tested (H1): Macroprudential policy instruments (household borrowing costs; interbank loans as a percentage of total loans; loan to deposit ratio; leverage ratio; and solvency ratio) enhance financial stability, as measured by credit growth, in four southern European economies (Greece, Italy, Portugal and Spain) from Q4 2010 to Q4 2018. The empirical results of this study suggest that, of the investigated macroprudential policy instruments, household borrowing costs, interbank loans as a percentage of total loans and loan to deposit ratio exhibit the predicted impact on credit growth rate. Leverage ratio and solvency ratio do not exhibit the expected impact on the response variable. Moreover, only three out of the five explanatory variables are statistically significant in the model. Consequently, it is not possible to confirm or reject the hypothesis based on the available data and results.

**Keywords:** macroprudential policy, macroprudential instruments, systemic risk, financial stability

## Introduction

In this paper, the impact is investigated of five macroprudential policy instruments on financial stability in four southern European EU member states (Greece, Italy, Portugal and Spain) over the time span from Q4 2010 to Q4 2018. The substantial losses that banks incurred during the 2007-2008 subprime crisis called into question the risk-taking behaviour of banks. Lehman Brothers' default pointed out the fact that financial stability has a macroprudential or systemic dimension. If the financial

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system is treated simply as the sum of its parts, its historical tendency to transition between booms and busts can be overlooked (Beck & Gambacorta, 2020). Prior to the emergence of the crisis, the banks were involved in exuberant risk-taking activities (Luu & Vo, 2020) and excessive lending to borrowers with dubious creditworthiness, which led to credit and asset price booms, a banking crisis, and a surge in non-performing loans (Festić & Romih, 2008).

In the fallout of the crisis, policymakers and academics recognised that more effective macroprudential policies and regulatory measures were required to reduce excessive optimism among economic agents, stem moral hazard behaviour, and prevent banks from unrestrained risk-taking (Luu & Vo, 2020). The ‘Greenspan doctrine’ (Greenspan, 2002, 2011), which advocated the view that it is preferable to inject liquidity into the financial system after a final crisis had occurred, has ended. The ex-ante policy interventions are no longer seen as too costly, blunt or unpredictable in their effects (Jeanne & Korinek, 2020). In the past few years, there has been a spike in empirical and theoretical studies on the subject of macroprudential policy and macroprudential regulation. This paper is a contribution to this field.

## Theoretical Background of Empirical Analysis

Macroprudential policy is concerned with systemic risk, which is defined as ‘the risk that an event will trigger a loss of economic value or confidence in, and attendant increases in uncertainty about, a substantial portion of the financial system that is serious enough to quite probably have significant adverse effects on the real economy’ (Group of Ten, 2001). There are three sources of systemic risk: macroeconomic shocks, which cause distress in the financial system; excessive leverage, which leads to imbalances in the financial system; and increasing interconnectedness and herd behaviour, which exacerbates contagion risk (Constâncio, 2016).

The European Central Bank (ECB, 2013c) defines financial stability as ‘a condition in which financial system intermediaries, markets, and market infrastructure can withstand shocks without major disruption in financial intermediation and, in general, supply of financial services.’ The macroprudential approach to financial stability sees risk as endogenous, i.e. contingent on the behaviour of all institutions that make up the financial system. Macroprudential policy is concerned with endogenous processes in the financial system, in which financial institutions that may be individually stable can find themselves in a situation of systemic instability. Institutions influence the prices of financial assets, the quantities borrowed and lent, and consequently the resilience of the economy and the strength of the institutions themselves.

From a macroprudential perspective, for soundness of the financial system as a whole it is neither necessary nor sufficient for each individual institution to be sound (Borio, 2011). What is important from a macroprudential perspective is the existence of correlated (common) exposures, diversification and pro-cyclicality (in other words, how system-wide risk can be magnified by interactions between the financial system and the real economy as well as by those within the financial system).

The aim of macroprudential policy, tools, instruments and measures is to build up (capital and liquidity) buffers in expansionary periods, so that they can be drawn down in periods of financial distress. This dampens the pro-cyclicality<sup>2</sup> of the financial system, mitigates systemic risk and fosters financial stability (Borio, 2011).

Literature examining the impact of macroprudential policy instruments is very broad and versatile. In general, three strands of literature can be identified (Morgan, Regis & Salike, 2019): The first strand is empirical research that employs cross-country macro data, the second are case studies of countries using micro-level data, while the third group of studies – which are the most recent – employs both macro- and micro-level data to estimate the impact of country-specific macroprudential policy instruments on financial stability.

Some studies assess the impact of macroprudential policy instruments on financial variables, such as asset prices, credit and financial imbalances in the economy (e.g. Akinci & Olmstead-Rumsey, 2018; Cerutti, Dagher & Dell’Ariccia, 2015; Lim et al., 2011), whereas others focus on the impact of macroprudential policy instruments on macroeconomic variables traditionally targeted by monetary policy – inflation and output (e.g. Richter et al., 2019; Kim & Mehrotra, 2017). Most studies construct dummy indices that are based on the dates of policy measures (Lim et al., 2011; Shim et al., 2013; Cerutti, Claessens & Laeven 2017; Cerutti, Correa, Fiorentino & Segalla, 2017; Akinci and Olmstead-Rumsey, 2018). The dummy indices signal a tightening or loosening of the macroprudential policy stance, but do not reflect the intensity of changes in macroprudential policy instruments (Kim & Oh, 2020). Some relatively recent studies incorporate the intensity of macroprudential policy measures. For example, Alam et al. (2019) and Richter et al. (2019) created a loan-to-value (LTV) index, which reflects the intensity of changes in the LTV cap, while Vandenbussche et al. (2015) designed dummy indices of policy measures, which incorporate the intensity of the changes.

<sup>2</sup> *Procyclicality is defined as the inclination of the financial system to reinforce the business cycle (Festić, 2006).*

Most of the literature is predominantly concerned with examining the impact of macroprudential policy instruments on bank lending as an intermediate target instead of on bank risk, the containment of which is the ultimate macroprudential policy objective (Altunbas, Binici & Gambacorta, 2017). Recent empirical results indicate that debt-to-income caps and loan-to-value caps are more effective than capital requirements for limiting credit growth (Claessens, Ghosh & Mihet, 2013). For instance, in Switzerland, the application of a countercyclical capital buffer to domestic residential mortgages had a negligible effect on loan granting (Basten & Koch, 2015). The key objective of the Basel III macroprudential tools is to bolster the resilience of the banking system (Altunbas, Binici & Gambacorta, 2017). Smoothing the credit cycle and restraining the boom is a welcome side effect that may be more or less pronounced (Drehmann & Gambacorta, 2012). Another strand of literature (e.g. Jakubik & Hermanek, 2008) investigates the impact of macroprudential policy instruments on financial stability by constructing stress scenarios and presenting stress test results.

The evidence on how effective macroprudential policy is on dampening the procyclicality of banking activity is accumulating, although it is still fragmented (Galati & Moessner, 2014; Claessens, Ghosh & Mihet, 2013). Macroprudential policy instruments seem to be effective in mitigating the sensitivity of leverage and credit to the business cycle, i.e. the procyclicality of leverage and credit growth (Lim et al., 2011). Macroprudential tools also appear to be effective in restraining asset growth, leverage and credit growth (Vandenbussche et al., 2015; Alper et al., 2014; Cerutti, Claessens & Laeven, 2017; Claessens, Ghosh & Mihet, 2013). In spite of these positive indications that the research on macroprudential policies is proceeding in the right direction, the evidence on the effectiveness of macroprudential policy measures is preliminary and there is still much to be done (Olszak, Roszkowska & Kowalska, 2018; Claessens, 2014; Akinici & Olmstead-Rumsey, 2018).

## Empirical Analysis: Data Specification and Variables, Hypothesis and Methodology

### Data and variables

All the data used in this empirical analysis were retrieved from the Statistical Data Warehouse of the European Central Bank (SDW, 2020), hereinafter the ECB SDW.

The following explanatory variables, representing macroprudential policy instruments, are employed in the model for this research paper:

- *BCH* = cost of borrowing from monetary financial institutions (MFIs) for households and non-financial corporations (NFCs).
- *INL* = interbank loans as percentage of total loans, measured as interbank loans divided by total loans.
- *LDR* = loan-to-deposit ratio, measured as the total number of loans, divided by the total number of deposits.
- *LR* = leverage ratio, measured as total assets divided by total equity.
- *SR* = solvency ratio, measured as total own funds, divided by risk weighted assets.

The following response variable, representing financial stability, is used in the model for this research paper:

- *CGR* = credit growth rate, measured by the domestic credit-to-GDP gap.

Financial stability is proxied with credit growth and/or house price growth in most papers that investigate the impact of macroprudential policy instruments on financial stability, e.g. Poghosyan, 2020; Richter, Schularick & Shim, 2019; Morgan, Regis & Salike, 2019; Kim & Oh, 2020; Nakatani, 2020; Davis, Liadze & Piggott, 2019; Olszak, Roszkowska & Kowalska, 2019; Ma, 2020; Meuleman & Vander Venet, 2020; Cizel, Frost, Houben & Wierds, 2019; Bambulović & Valdec, 2020; Gambacorta & Murcia, 2020; and Ely, Tabak & Teixeira, 2021.

The model used in this paper was applied to four southern European EU member states (Greece, Italy, Portugal and Spain) and 34 quarters (Q3 2010 to Q4 2018). After taking the time series at first difference for stationarity purposes, the number of quarters is reduced to 33 (Q4 2010 to Q4 2018).

### Hypothesis and the expected relationship between the explanatory and response variables

The following hypothesis (H1) was tested: ‘Macroprudential policy instruments (cost of borrowing from MFIs for households and NFCs; interbank loans as a percentage of total loans; loan-to-deposit ratio; leverage ratio; and solvency ratio) enhance financial stability, as measured by credit growth’.

The cost of borrowing from MFIs for households and NFCs can be seen as an indirect macroprudential policy instrument if, for instance, due to higher reserve requirements or changes in another macroprudential policy measure implemented by the macroprudential authorities, banks decide to pass on the higher costs to their customers (Arregui et al. 2013; Zhang & Zoli, 2014). Higher mortgage interest rates and/or

higher interest rates on other types of loans imply that fewer clients will be able to take out more expensive loans. This is likely to reduce the banks' extension of credit and suppress credit growth in the economy. As such, it is assumed that an increase in BCH (the cost of borrowing from MFIs for households and NFCs) will have a negative effect on credit growth, thereby promoting financial stability.

Another macroprudential policy instrument which the authors of this paper decided to include in their analysis are interbank loans expressed as a percentage of total loans (INL). The higher the INL ratio, the more likely that a common shock to banks' external assets or liabilities will have systemic repercussions (i.e. will not stay with just one bank, but will also be transferred to other banks in the system). The lower the INL ratio, i.e. the less lending among banks and the more diversified banks' portfolios, the lower the likelihood and the strength of the propagation of contagion (Roncoroni et al., 2019). *The authors predict that an increase in the INL ratio will have a positive effect on credit growth, thereby undermining financial stability.*

The most widespread macroprudential policy tools, which existed already prior to the development of the Basel III, CRR and CRD IV standards and legal requirements, are the loan-to-value (LTV) caps and debt-to-income (DTI) or debt-service-to-income (DSTI) caps. The LTV ratio limits the amount of the loan relative to the value of the property. The DSTI ratio limits the debt servicing cost relative to the borrower's disposable income (Szpunar, 2017). The LTD ratio (hereinafter LDR) limits the amount of the loans that can be extended for each unit of currency of deposits. If the LDR is excessively high, a bank may not have sufficient liquidity in the event of loan defaults in a period of financial distress. These tools predominantly impact the supply and demand for mortgages. For the purposes of this study, the author decided to introduce the loan-to-deposit ratio (LDR) as the borrower-based explanatory variable. *The authors presume that an increase in the LDR will have a positive effect on credit growth, thereby compromising financial stability.*

Since mid-2021, the amended EU regulation has set forth a binding leverage ratio, which is a non-risk-based measure of banks' assets in relation to capital. The amount of an institution's Tier 1 capital base needs to amount to at least 3% of its non-risk-weighted assets ('exposure measure', which is a sum of on-balance sheet exposures, derivative exposures, securities financing transactions, and off-balance sheet items)<sup>3</sup>. In

<sup>3</sup> In this analysis the authors actually use a more traditional definition of the leverage ratio (i.e. total assets divided by total equity), however, the general idea is the same. The traditional definition of the leverage ratio is used because the time series for the leverage ratio which uses the new definition (Tier 1 capital divided by exposure measure) is not yet long enough.

addition, global systemically important institutions (G-SIIs) will need to maintain an additional leverage ratio buffer. The purpose of the leverage ratio is to provide a back-stop to the risk-based measures and to prevent excessive leverage from building up. It does not distinguish one asset class from another (Linklaters LLP, 2019ab). For the purposes of this paper, the authors decided to employ leverage ratio as one of the macroprudential policy instruments, with the aim of investigating its impact on financial stability. This is because the banks have already been reporting it for some years now despite the fact that it is not yet binding. Moreover, it is one of the few measures that do not depend on the risk-weighted assets, but rather simply on assets without having risk weights applied to them. The authors' conjecture is that an increase in the leverage ratio (measured as total assets divided by total equity) will have a positive impact on credit growth, thereby compromising financial stability.

In 2013, the Basel III rules, which, by and large, have been transposed into the EU legislative requirements, introduced new macroprudential instruments, such as the countercyclical capital buffer (CCyB), which limits the build-up of systemic risk in expansionary periods (Szpunar, 2017). Other buffers, which need to be met with CET1 capital, are the systemic risk buffer (SRB), the global systemically important institutions buffer (G-SII buffer), the other systemically important institutions buffer (O-SII buffer), and the capital conservation buffer (CCoB). Moreover, higher CET1 ratios, and by extension higher solvency ratios (SR), can also be seen as a macroprudential policy instrument, since, as part of the Pillar 2 supervisory review process, supervisory authorities in the EU (the national supervisory authorities and the European Central Bank) set capital requirements for individual banks in the EU by considering their individual risk profiles and stress test results after having conducted a peer-comparison and considered micro- and macro-prudential indicators. Indeed, Klinger and Teply (2014) demonstrate that sufficient capital buffers are key for safeguarding the stability of the financial system as a whole. *The authors of this paper predict that an increase in the solvency ratio (SR) will have a negative effect on credit growth, thereby enhancing financial stability.*

The expected impact of an increase in individual explanatory variables on credit growth rate and on financial stability is shown in Table 1.

## Methodology

In order to test the hypothesis of this paper, the authors employed the quantitative research method of panel econometrics. Panel data allow for the identification of certain

questions or parameters without the need to make restrictive assumptions and can be compared to cross-sectional assemblies or time series (Verbeek, 2004). Panel regression renders it possible to study variables that have both the space dimension (in this case, several countries) as well as the time dimension (in this case, several quarters). Furthermore, panel regression controls for omitted variables alleviates the problem of collinearity among explanatory variables, dismisses heterogeneous effects, and may reduce measurement errors and endogeneity bias by including the lags of the regressors. The problem of spurious regression can be circumvented by using the differences of the variables expressed as percentage changes (Festić, 2015; Festić, Kavkler & Repina, 2011; Hahn & Hausman, 2002; Murray, 2006). The stationarity of the time series is verified using the Augmented Dickey-Fuller (ADF) test. The authors tested both the fixed effect and the random effect models and verified the p-values of the redundant fixed effects test and the Hausman test (Hausman, 1978).

Some authors claim that the differences between various economies and/or quarters can be accommodated by introducing a different intercept, whereas the slope coefficients remain constant (Gujarati, 2003; Allison, 2009; Hsiao, 1985; Wooldridge, 2010). The combination of time series and cross-section observations results in less collinearity among variables, more variability, more degrees of freedom, more efficiency, and more informative data. Panel regression is used in several studies by, for instance, Gambacorta and Murcia (2020), Akinci and Olmstead-Rumsey (2018), Ercegovac, Klinac and Zdrilić (2020), Valdivia Coria and Valdivia Coria (2019), and Bambulović and Valdec (2020).

If the individual, or cross-section specific, error component (unobserved effect)  $\epsilon_i$ , and one or more of the BCH, INL,

**Table 1.** The expected impact (positive or negative) of a unit increase in individual explanatory variables on the credit growth rate and financial stability, and the expected signs of regression coefficients

Explanatory variable experiencing a one-unit increase	Impact on CGR (expected sign of the regression coefficient)	Impact on financial stability
BCH	-	+
INL	+	-
LDR	+	-
LR	+	-
SR	-	+

Notes: A plus (+) implies a positive impact, whereas a minus (-) stands for a negative effect.  
Source: Authors.

LDR, LR and SR regressors are correlated, it is better to use the fixed effects rather than random effects model. Since the number of cross-sections in the model used in this paper (four cross-sections) is less than the number of coefficients (six coefficients, which include five explanatory variables and the constant), it will not be possible to estimate the cross-section random effects model and the cross-section and period random effects models together. Instead, the authors will estimate the fixed effects models as well as the period random effect model. Namely, when trying to empirically estimate a model where the number of cross-sections is less than the number of coefficients, an EViews error message is displayed, which reads ‘Not possible to estimate, since random effects estimation requires number of cross sections > number of coefs for between estimator for estimate of RE innovation variance.’

Formal econometric tests help when deciding which model is more appropriate for use in a certain situation. The redundant fixed effects test is used to decide between the pooled and the fixed effects model. The Hausman test is used to distinguish between the fixed effects and the random effects model. If the null hypothesis is not rejected, the random effects estimator is consistent and efficient. On the other hand, if the alternative hypothesis is not rejected, the fixed effects estimator is at least as consistent as the random effects’ estimator and hence preferred (Gujarati, 2003; Allison, 2009; Hsiao, 1985; Wooldridge, 2010).

## Empirical Results and Discussion

All the explanatory variables, as well as the response variable, in this research paper are stationary at first difference ( $p < 0.05$ , hence  $H_0$  is rejected; the unit root is not present; the time series is stationary), but most of them are not stationary at level (Table 2). All of the time series are integrated of order one, i.e. I (1). To denote that all variables are taken at first difference for stationarity, all the regressors and the regress and have a ‘D’ in front of their name (e.g. CGR becomes DCGR; BCH becomes DBCH and so forth for the rest of the variables) in Table 3. The authors tried to introduce lags and the logarithmic form to their models, however, those models proved to be less statistically significant and less robust than the models described in this paper.

The empirical results shown in Table 3 indicate that period fixed effects, together with the cross-section fixed effects and period fixed effects, are present in the model used in this paper, since the F probability of the redundant fixed effects test for each of the models is less than 0.01. Fixed effects are present in the model where the intercept varies over time (period fixed effects model), and where the intercept varies

both according to individual countries and time (cross-section fixed effects and period fixed effects model). However, fixed effects are not present in the model where the intercept varies according to individual countries (cross-section fixed effects model). The slope coefficients are constant in all the models. The random effects estimator is not consistent in the model, since the p-value of the Hausman correlated random effects test is less than 0.01. Hence, in the evaluation of the empirical results, only the period fixed effects model (hereinafter PFEM) is considered, together with the cross-section fixed effects and period fixed effects model (hereinafter CSFEPFEM).

**Table 2.** Unit root test (Fisher ADF-test)

Response and explanatory variables	Level (x) ADF-Fisher Chi-square statistic (ADF-Fisher Chi-square probability)	First difference d(x) ADF-Fisher Chi-square statistic (ADF-Fisher Chi-square probability)
CGR	1.815270 (0.3718)	10.68471 (0.0000)
BCH	2.92160 (0.9392)	26.3717 (0.0009)
INL	24.0973 (0.0022)	70.4547 (0.0000)
LDR	5.19312 (0.7368)	54.9994 (0.0000)
LR	7.05639 (0.5306)	34.4759 (0.0000)
SR	3.64628 (0.8875)	64.1851 (0.0000)

Notes: P-values for the Fisher-ADF panel unit root test are computed using the asymptotic Chi-square distribution and given in brackets. The maximum number of lags was automatically selected using the Schwarz Information Criterion.

Source: Authors.

In terms of the H1 hypothesis of this research, which states that (Table 1):

- an increase in BCH has a negative effect on CGR
- an increase in INL has a positive effect on CGR
- an increase in LDR has a positive effect on CGR
- an increase in LR has a positive effect on CGR
- an increase in SR has a negative effect on CGR

it can only be partially confirmed, given that the results of the empirical model (Table 3) indicate that:

- an increase in BCH has a negative effect on CGR (thus confirming the hypothesis of this research)

- an increase in INL has a positive effect on CGR (thus confirming the hypothesis of this research)
- an increase in LDR has a positive effect on CGR (thus confirming the hypothesis of this research)
- an increase in LR has a negative effect on CGR (thus rejecting the hypothesis of this research)
- an increase in SR has a positive effect on CGR (thus rejecting the hypothesis of this research)

Furthermore, the BCH, LDR and SR constants are statistically significant at a significance level of 1%, 5% or 10% in both the models under consideration (PFEM and CSFEPFEM).

The explanatory power of both *PFEM* and *CSFEPFEM* is relatively high, since the R-squared is 0.49 and 0.51 respectively. Prob(F-statistic) in both models is less than 0.01, implying that each model as a whole is statistically significant.

Only three regressors (out of five) have the signs predicted by hypothesis 1. Moreover, the INL and LR variables are not significant in the two models under observation. Consequently, it is not possible to either confirm or reject the hypothesis based on the available data.

The empirical results of this research indicate that macroprudential policy instruments have a certain impact on financial stability. The weaknesses of the regression models used in this study are that they do not capture well the interactions between macroprudential policy instruments, financial and real economic sectors, and the macroprudential policy transmission mechanism. Furthermore, the effects of macroprudential policy were not isolated from those of monetary policy (Carreras, Davis & Piggott, 2018). This study does not allow for a possible correlation between the time series processed in the long term because the variables are only included in the differences, which does not allow the long-term effects of macroprudential policy instruments to be studied.

Furthermore, certain macroprudential policy instruments appear to influence credit growth in a different matter to that expected. For instance, it would be expected that an increase in leverage ratio increases credit growth, thereby undermining financial stability. However, the empirical results of this research indicate that the opposite could be the case. A plausible explanation for this could be that in economic downturns, when credit growth is lower or negative, households, non-financial institutions and financial institutions are more indebted (i.e. more leveraged). In this case, the causal relationship goes from the

**Table 3.** Empirical results

Response variable	Explanatory variable/statistics	Cross-section fixed effects	Period fixed effects	Cross-section fixed effects and period fixed effects	Period random effects	
DCGR		-1.135984	-1.202089	-1.235976	-1.134986	
	C	(-6.826504) (0.0000)***	(-7.394879) (0.0000)***	(-7.574468) (0.0000)***	(-6.714869) (0.0000)***	
	DBCH		-0.155138	-2.273628	-2.499281	-0.327580
			(-0.181016) (0.8567)	(-1.799156) (0.0753)*	(-1.891022) (0.0619)*	(-0.396838) (0.6922)
			-0.047770	0.062179	0.080586	-0.064091
	DINL		(-0.205247) (0.8377)	(0.256182) (0.7984)	(0.332676) (0.7402)	(-0.299922) (0.7647)
			0.077545	0.152839	0.130434	0.110332
	DLDR		(1.778784) (0.0778)*	(3.251095) (0.0016)***	(2.614745) (0.0105)**	(2.814914) (0.0057)***
			-0.912542	-0.523725	-0.506713	-0.778994
	DLR		(-2.943262) (0.0039)***	(-1.592386) (0.1148)	(-1.436289) (0.1545)	(-2.832011) (0.0054)***
			0.526329	1.032807	1.018127	0.615472
	DSR		(2.121811) (0.0359)**	(3.608084) (0.0005)***	(3.563672) (0.0006)***	(2.640203) (0.0094)***
		R-squared	0.105464	0.487665	0.508308	0.113398
	S.E. of regression	1.612645	1.420939	1.415816	1.524492	
	F-statistic	2.876725	2.315306	2.248502	3.120793	
	Prob. (F-statistic)	(0.017195)	(0.000667)	(0.000857)	(0.010970)	
	Sum squared resid	317.2760	181.7162	174.3944	283.5371	
	Durbin-Watson stat	1.076571	1.240449	1.268606	1.093181	
	Redundant fixed effects test (F prob.)	(0.2811)	(0.0034)	(0.0040)	N/A	
	Hausman correlated random effects test (Chi-square prob.)	N/A	N/A	N/A	0.0003	

Notes: In the table, all the regressors and the regressand have a 'D' in front of their name (e.g. CGR becomes DCGR; BCH becomes DBCH and so forth for the rest of the variables), since all the variables are taken at first difference for stationarity. The t-statistics are given in brackets below the coefficients and the p-values are given in brackets below the t-statistics. The significance levels are denoted as: \*\*\*Significant at 1%, \*\*Significant at 5%, \*Significant at 10%.

Source: Authors.

state of the economy (credit expansion or contraction) to the changes in the calibration of macroprudential instruments (in this case, the maximum allowed leverage ratio). Indeed, methodologically, any estimation deals with the inherent endogeneity problem, since policymakers usually implement measures in response to systemic risk, credit and financial cycles, indicated by, for example, excessive

credit growth or excessive house price growth (Cizel et al., 2019; Gadatsch, Mann & Schnabel, 2018). As such, macroprudential policy instruments may be influenced by the target variables, which creates reverse causality. This could lead to an estimation bias, underestimating the effectiveness of macroprudential policy measures (Kuttner & Shim, 2016).

## Conclusion

The traditional policy measures were not sufficient to avert the 2007 global financial crisis and failed to ensure a smooth and fast recovery. Since 2007, macroprudential policy instruments have gained in recognition as a crucial tool in enhancing financial stability. Monetary policy, fiscal policy, and microprudential policies operate with a different toolkit and focus on achieving goals other than the stability of the financial system as a whole. In light of this, a fourth policy – namely macroprudential policy – is required to mitigate and prevent emergence shocks, which could destabilise the financial system as a whole and compromise financial stability.

The following hypothesis (H1) was tested: Macroprudential policy instruments (household borrowing costs; interbank loans

as a percentage of total loans; loan to deposit ratio; leverage ratio; and solvency ratio) enhance financial stability, as measured by credit growth, in four southern European economies (Greece, Italy, Portugal and Spain) from Q4 2010 to Q4 2018.

The empirical results of the study suggest that, of the investigated macroprudential policy instruments, household borrowing costs, interbank loans as a percentage of total loans and the loan to deposit ratio exhibit the predicted impact on credit growth rate. Leverage ratio and solvency ratio do not exhibit the expected impact on the response variable. Moreover, the variables interbank loans expressed as a percentage of total loans and leverage ratio are not significant in the two models under observation. Consequently, it is not possible to either confirm or reject the hypothesis based on the available data and results.

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## Vpliv instrumentov makroprevidnostne politike na finančno stabilnost v Južni Evropi

### Izvleček

Pričujoči članek predstavlja prispevek k obstoječim znanstvenim raziskavam na področju učinkov instrumentov makroprevidnostne politike na finančno stabilnost. V članku smo preverili sledečo hipotezo (H1): instrumenti makroprevidnostne politike (stroški izposojanja gospodinjstev; medbančna posojila, izražena kot odstotek vseh posojil; razmerje med posojili in depoziti; stopnja finančnega vzvoda; in stopnja solventnosti) pozitivno prispevajo k finančni stabilnosti, izraženi s stopnjo rasti posojil, v štirih južnoevropskih gospodarstvih (Grčiji, Italiji, Portugalski in Španiji) od zadnjega četrletja 2010 do zadnjega četrletja 2018. Naši empirični rezultati kažejo, da imajo trije instrumenti (od preučeni petih instrumentov makroprevidnostne politike) predvideni vpliv na stopnjo rasti posojil. Ti instrumenti so stroški izposojanja gospodinjstev; medbančna posojila, izražena kot odstotek vseh posojil; ter razmerje med posojili in depoziti. Po drugi strani stopnja finančnega vzvoda in stopnja solventnosti nimata pričakovanega vpliva na odvisno spremenljivko. Razen tega so v našem empiričnem modelu le tri od petih pojasnjevalnih spremenljivk statistično značilne. Iz tega sledi, da na podlagi razpoložljivih podatkov in rezultatov ne moremo niti potrditi niti zavrniti postavljene hipoteze (H1).

**Ključne besede:** makroprevidnostna politika, makroprevidnostni instrumenti, sistemsko tveganje, finančna stabilnost