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NON-PERFORMING LOANS AND FINANCIAL CONSUMER PROTECTION POLICIES: EMPIRICAL EVIDENCE FROM A BROAD INTERNATIONAL SAMPLE

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ABSTRACT

This study explores the relationship between policy choices in financial consumer protection (FCP) and non-performing loans (NPLs) in a broad international context, recognising that NPLs negatively affect citizens' well-being and the social pillar of sustainable development.

Nine FCP indices were constructed to capture distinct regulatory choices based on regulators' responses to the World Bank FICP surveys. The estimation framework extends standard macroprudential models by adding institutional indicators for the general environment, as well as for the corporate and household credit segment, with the latter being represented by the FCP indices. We estimate seven models using an unbalanced dataset of 113 countries. These include a within model, two supplementary cross-sectional models, and four time–cross-section panel models that serve as the main specifications. Two FCP indices show unfavourable associations with NPL dynamics – financial inclusion (moderate) and credit pricing (small) – while three show favourable associations – financial literacy (moderate), credit reporting (moderate), and regulatory capacity (large).

Four other indices – information disclosure, affordability, fair treatment, and debt resolution – do not show sufficient evidence of association with NPL dynamics.

Financial inclusion shows a concerning association, suggesting a potential trade-off between wider credit access and credit quality, which may be particularly acute under weak responsible-lending requirements. By contrast, the small positive association for credit pricing is economically minor and may be explained by a denominator effect arising from lower pre-COVID NPL levels.

Policies on financial literacy, credit reporting, and regulatory capacity show evidence of robust negative associations, indicating favourable outcomes in terms of NPL dynamics for these policy choices. The FCP policies represented by the other four indices may still be favourable for citizens' well-being through effects not captured in this NPL-focused analysis, which is also constrained by the short and small panel dataset.

Keywords: NPLs, FCP, financial literacy, financial inclusion, financial sector regulation

JEL Classification: D18, G21, G28

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INTRODUCTION

Although financial consumer protection (FCP) has deep historical roots and gained renewed prominence after the global financial crisis, empirical evidence on its effects remains scarce. This study complements the predominantly normative FCP literature with an empirical assessment that links multi-dimensional FCP policy choices to non-performing loan outcomes. The FCP is analysed through nine distinct dimensions, each reflecting different policy choices that may influence financial service outcomes in diverse ways, despite the common objective of safeguarding citizens' financial and general well-being. Policy variation can arise from local market dysfunctions and inefficiencies that trigger regulatory intervention, different degrees of regulatory capture, and divergent societal

preferences for governmental intervention. In some markets, high levels of socially responsible self-regulation may result in sustainable development with a minimal role for government, whereas others may require stronger government intervention to improve market efficiencies and social outcomes.

Within this framework, non-performing loans (NPLs), particularly in the household segment, represent one of the most detrimental social outcomes of financial services, best avoided or minimized. High NPL ratios can signal non-sustainable financial market functioning, where planned financial outcomes fail, causing hardship, stress, financial constraints, and other adverse effects on debtors' lives.

Most existing studies either treat FCP as an aggregate measure or focus narrowly on a single dimension, most often financial literacy or financial inclusion, overlooking FCP's multidimensional nature. This study advances the literature by offering a multidimensional perspective on FCP, using the World Bank's Financial Inclusion and Consumer Protection (FICP) surveys, an under-researched data source with a broad international sample including low-income and lower-middle-income countries, often excluded in similar analyses. The study examines how different FCP dimensions relate to NPLs in the context of adverse debt outcomes for households.

LITERATURE REVIEW

The academic and policy literature on FCP has expanded over the past decades, but remains fragmented. Much of it still relies on normative frameworks and either treats FCP as a single aggregate construct or focuses narrowly on a specific FCP dimension, most often financial literacy or financial inclusion, overlooking FCP's multidimensional nature. Another key limitation of research in the FCP area is the tendency to analyse broad macroeconomic or financial sector outcomes with only limited consideration of the implications for consumers and the ultimate outcomes of policy choices on their well-being. At the same time, the extensive World Bank FICP survey, with its unique, broad cross-country data, remains under-researched despite its potential for multidimensional measurement of FCP and evidence-based policy analysis. The further literature review is structured around four groups of relevant papers: those that use data from the FICP survey, those that examine FCP in general and as an aggregate, those that focus on a single component of FCP, and those that develop macroprudential models that serve as the methodological basis for our estimation.

We start with the scarcest group of papers. We have identified only two peer-reviewed articles that utilized the FICP survey dataset in their estimation, both based on the earlier, not-publicly disclosed data for the survey conducted in 2013. To date, we have not identified peer-reviewed articles that incorporate the more recent, publicly available FICP survey data released in 2017 or in 2023. The first article (Kriese, Abor, & Agbloyor, 2019) explores associations between economic growth and FCP policy choices represented by responses to 8 questions in the FICP survey conducted in 2013. The study finds positive and statistically significant associations with FCP policy choice related to issuing warnings, specifying elements of responsible lending in the regulation, restricting unauthorized data use, requiring complaint procedures, while on-site inspections, and all three questions on information disclosure show insufficient evidence of a statistically significant relationship. From the perspective of our research question, the approach lacks justification for the very few selected questions that are assumed to represent complex FCP dimensions. Then methodologically it estimates the importance of each dimension separately in the models rather than within a joint specification with all FCP dimensions. Such separation fails to account for collinearity among the dimensions, which may lead to misestimation of their individual effects and limit the ability to explore more nuanced policy pathways within the FCP framework. In addition, the choice of the real GDP growth or per capita GDP change as the dependent variable constitutes a distant and indirect proxy for consumer outcomes, which should be the primary focus of FCP policy objectives.

The second article (Pasiouras, 2018) places greater emphasis on the FCP dimensions, identifying six of them and constructing a composite index for each by evaluating responses to selected relevant questions from the FICP surveys conducted in 2010 and 2013. The paper examines the association with the net interest margin (NIM) as a measure of the cost of financial intermediation. It uses a panel random-effects model with an extensive dataset that combines bank-level and country-level variables across a broad international sample. The study analyses the effects of the legal framework, institutional arrangements, supervisory powers, complaint resolution, fair treatment, and disclosure requirements. The findings indicate that in advanced economies, five out of six FCP dimensions are negatively associated with NIM, which is interpreted as a favourable outcome for consumers, whereas in developing countries, all FCP dimensions show positive associations – an unfavourable outcome. The author attributes this difference between the country groups to the possibility for cost pass-through to consumers in less developed markets due to less competitive and underpenetrated markets, weaknesses of the regulators, deficiencies in the legal systems, and related reasons. Although the article comprehensively considers the multidimensional nature of the FCP, it does not estimate the dimensions jointly, even after finding evidence

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of relevance for many of them. As in the first article, the separate specifications ignore collinearity among the dimensions and are subject to omitted variable bias. In addition, from the perspective of our research question with a focus on consumer well-being, the choice of NIM as the dependent variable, while valuable for assessing market efficiency, provides only a bank-level proxy and thus an indirect view of consumer-level outcomes.

The second group of articles, together with regulatory and policy papers, provides a rich basis for discussing general aspects of FCP. Much of this literature is rooted in normative legal analyses of what constitutes a fair and well-functioning market for consumers. Some studies explore the historical and ethical origins of FCP, including references to ancient religious texts (Rasor, 1993), while others focus on theoretical explanations of market failures, with the US mortgage crisis and the subsequent global financial crisis serving as prominent examples (Cherednychenko & Meindertsma, 2019) and (Levitin, 2012). However, a concerning issue is that these valuable theoretical contributions often remain empirically untested, as highlighted by the meta-review by Garz et al. (2021).

The third group of articles focuses on specific dimensions of FCP, and here an imbalance of scholarly attention becomes evident. A Scopus search of publication titles, abstracts, and keywords for the period 1975-2025 (*Table 1*) shows that research on financial inclusion and financial literacy dominates with 17,778 and 9,896 records, respectively, while the broader discussions explicitly framed as financial consumer protection (1,513) as well as FCP specific dimensions such as credit reporting (249), responsible lending or credit (131) and fair treatment (67) remain comparatively under-represented. Moderate levels of coverage are observed for information disclosure and for consumer recourse mechanisms with 1,629 and 1,911 records, respectively. Furthermore, much of the empirical research in this group is based on single-country or regional case studies, with limited room for generalization and extrapolation because of legal, institutional, and cultural differences across markets.

Table 1. Scopus search results for the period 1975-2025. *(Source: search requests in article title + abstract + keywords were implemented by author at https://www.sciencedirect.com/search/entry, dated August 2025)*

Search request	Number of records
"inclusion" AND "financial"	17.778
"literacy" AND "financial"	9.896
"financial" AND ("debt resolution" OR "complaint")	1.911
"information disclosure" AND "financial"	1.629
("consumer protection" AND "financial") OR "consumer financial protection"	1.513
"usury law" OR "interest rate ceiling" OR "interest rate cap" OR "interest rate restrictions" OR ("financial" AND "price restrictions")	266
"credit reporting"	249
"responsible lending" OR "responsible credit"	131
"financial" AND "fair treatment"	67
"financial consumer protection" AND ("mandate" OR "regulation" OR "regulator")	42

The fourth group of articles represents macroprudential studies that seek to establish relationships between non-performing loans and macroeconomic variables. These studies propose econometric models that serve as a starting point for our empirical approach. We have identified four relevant papers for this group. The first is a highly cited IMF Working Paper by Nkusu (2011), which uses a panel dataset of annual indicators for 26 advanced economies over the period 1998-2009 and estimates the relationship between change in non-performing loans and macroeconomic variables. The study applies several estimation methods for a dynamic panel model, including pooled OLS with robust errors, panel-corrected standard errors (PCSE), and generalised method of moments (GMM) with an Arellano-Bond specification. The estimation results support the hypothesis about the relationship between NPLs and macroeconomic variables, and, using a vector autoregressive (VAR) approach, the paper also finds evidence of a feedback effect relationship from changes in NPLs to macroeconomic variables.

The second paper, by Rinaldi et al. (2006), focuses on changes in household NPLs using quarterly panel data over 3Q 1989 to 2Q 2004 for seven EU countries and two estimation methods: fully modified OLS and PCSE. This paper confirms the relationship between household NPLs and macroeconomic factors, including a debt burden indicator. While discussing the estimation results, the paper suggests that part of the variation in household NPLs is likely due to differences in institutional characteristics, structure of demand and supply in the consumer lending market, which should be considered as additional explanatory variables in future research. Our study takes this suggestion closely.

The next paper, by Espinoza et al. (2010), examines the NPL ratio for 80 banks in six Gulf countries for 1995-2008. This estimation uses a mix of bank-specific and country-specific indicators applying four methods: pooled OLS, fixed effects, difference GMM, and system GMM. The results support the hypothesis of relevance of macroeconomic variables in explaining NPLs, the response impact from NPLs, and provide evidence of cumulative effects from macroeconomic variables lasting up to three years.

The last paper in the group, by Daniel Buncic and Martin Melecky, uses panel data for 54 high- and middle-income countries during 1994-2004 and applies the GMM method with Arellano-Bond specification (Buncic & Melecky, 2013). The results, being similar to other papers, support the relevance of macroeconomic factors in explaining changes in NPLs.

These four papers are valuable contributions to our research as they suggest using a panel dataset, identify a set of relevant macroeconomic variables, theorise the possibility of expanding the set of explanatory variables to include institutional indicators, and illustrate available econometric methods and model specifications.

AIMS AND OBJECTIVES

The research aims to comprehensively examine the relationship between NPLs and FCP policy choices in a broad international context, taking into account the multidimensional nature of FPC. The respective objectives include:

- analysing theoretical and empirical macroprudential approaches to understanding changes in NPLs;
- constructing and estimating FCP indices that describe distinct policy dimensions;
- developing a macroprudential model that incorporates FCP indices and control variables for macroeconomic and other institutional contexts;
- compiling a panel dataset and performing econometric estimation using appropriate methods, (5) interpreting the results and identifying directions for further research.

METHODS

The choice of methods is determined by the analysis of relevant research papers and by the specific conditions of the present study. The methodological framework is therefore organized in two stages:

1. Construction of FCP indices based on the World Bank FICP surveys.
2. Econometric modelling.

In stage 1, we worked with the World Bank's structured and closed-format FICP survey data released in 2017 and 2023 (World Bank, 2017; World Bank, 2023a). The survey responses are prepared by financial sector regulators and describe either the regulatory conditions for the financial market as a whole or regulations relevant to specific types of financial institutions. We systematized the survey questions into distinct FCP dimensions (*Table 2*) and identified in each dimension a consistent set of questions and responses present in both survey waves. The closed-format responses were coded into numerical scores and aggregated into nine FCP policy indices representing regulatory choices in each country (jurisdiction) (The FICP survey defines units as regulatory jurisdictions, but as most are countries, we refer to them simply as countries). A detailed methodology for the construction of the FCP indices is presented in a respective article (Murina, 2025). The resulting FCP indices include financial inclusion, financial literacy, disclosure requirements, credit reporting, affordability, credit price regulation, fair treatment, dispute resolution, and regulatory capacity.

Table 2. Systemization of FICP surveys for 2017 and 2023. *(Source: Author's calculation for the FICP survey datasets available from https://www.worldbank.org/en/topic/financialinclusion/brief/ficpsurvey)*

Topic	2017		2022	
	Questions	Response items	Questions	Response items
1. Structure of financial institutions	2	7	5	24
2. Permitted activities	17	183	28	288
3. Legal framework	8	51	9	61
4. Financial inclusion	3	19	7	119

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Table 2. Continued.

Topic	2017		2022	
	Questions	Response items	Questions	Response items
5. Financial literacy	14	35	17	75
6. Price regulation	2	25	1	18
7. Disclosure requirements	6	238	8	153
8. Credit reporting	1	6	1	36
9. Dispute resolution	10	50	14	79
10. Personal data protection	4	52	18	133
11. Other consumer protection policies	6	21	18	116
Total	73	687	126	1,102

The combined survey sample provides broad geographical and income-level international coverage. For stage 2, the refined sample was prepared, which includes all countries participating in the FICP surveys for which sufficiently complete macroeconomic data are available in the World Bank and IMF open-access databases (*Table 3*).

Table 3. Country participation in FICP surveys and the estimation sample. Note: All values are numbers of countries.

Status of participation in FICP surveys	Responded to FICP survey	Missing NPL or other macroeconomic data	Included in the stage 2 sample
1. Participated in both survey rounds	95	11	84
2. Participated only in 2017	26	10	16
3. Participated only in 2022	23	10	13
Total	144	31	113

For stage 2, we review and select econometric methods for the estimation. The FCP indices are considered as an extension to the set of explanatory variables in a macroprudential model, as suggested in relevant literature (Rinaldi & Sanchis-Arellano, 2006). Therefore, the analysis of the estimation methods begins with a review of relevant macroprudential research papers (*Table 4*).

A specific challenge in our research relates to the structure of the data: we have only two time points, each representing a multi-year reference window around the respective survey dates. This makes our panel data a short panel (T=2). In such settings, methods that rely on lagged variables as instrumentals (methods 5-7 in *Table 4*) are not feasible.

Among the remaining methods, the fixed-effects (within) estimator is the most conservative and appropriate method to start with in our case of T=2; it is also equivalent to the first-difference estimator. This method removed all cross-sectional variation, restricting the estimation only to across-time variation, which may not be informative in our case, given the limited changes in FCP indices over time and a relatively small sample. The other methods may only be appropriate if the respective diagnostic tests are supportive.

Therefore, the study begins with fixed-effects estimation (FE) and then tests the suitability of the other three methods: random-effects (RE), pooled OLS, and PCSE.

Table 4. Methods review and justification for a short balanced panel dataset. Note: The assessment of suitability for the target dataset T=2 and N=82 is based on the theoretical review of these estimation methods in Cameron & Trivedi, *Microeconometrics Using Stata*, Chapters 8 and 9 (pp. 235–318). (Trivedi & Cameron, 2010). *(Source: Author's systematization)*

Panel data estimation method	Nkusu (2011)	Rinaldi & Sanchis-Arellano (2006)	Espinoza & Prasad (2010)	Buncic & Melecky (2013)	Suitability for the dataset T=2 and N=84
1. Pooled OLS	Yes		Yes		Possible, requires testing
2. Fixed-effects (FE)			Yes		Possible
3. Random-effects (RE)					Possible, requires testing
4. PCSE	Yes	Yes			Possible, requires testing; works better with long panels T>2
5. Difference GMM with Arellano-Bond specification	Yes		Yes	Yes	No, because (1) lagged levels cannot be used as instruments when T=2; (2) for dynamic panel models, it is unsuitable; (3) requires large samples to satisfy asymptotic properties
6. System GMM			Yes		
7. FMOLS		Yes			No, as this model is only applicable to long panel datasets

As for the model specification, the dependent variable is the log-difference of the NPL ratio, where the difference represents the change over a two-year window around each survey wave, i.e., the change from 2015 to 2017 for the survey conducted at the end of 2016 – beginning of 2017, and from 2021 to 2023 for the survey conducted in 2022. The explanatory variables are grouped into four blocks: macroeconomic indicators, indicators of general institutional development, indicators specific to the corporate credit segment, and indicators specific to the household credit segment.

The general form of the model specification can be written as:

$$NPL_{IDn,t} = \alpha + \mu_{IDn} + \sum_{i=1}^{5} \beta^i * y^i_{IDn,t} + \sum_{k=1}^{4} \gamma^k * z^k_{IDn,t} + \sum_{m=1}^{4} \delta^m * x^m_{IDn,t} + \sum_{j=1}^{9} \theta^j * v^j_{IDn,t} + \varepsilon_{IDn,t} \quad (1)$$

where $NPL_{IDn,t}$ denotes the log-difference of the NPL ratio for a country (jurisdiction) IDn at time point t; $y^i_{IDn,t}$ represent the five macroeconomic indicators; $z^k_{IDn,t}$ the four indicators for general institutional development; $x^m_{IDn,t}$ the four indicators for the corporate credit segment; $v^j_{IDn,t}$ the nine FCP indices as institutional indicators for household credit segment; $(\alpha + \mu_{IDn})$ represents the general form of the intercept, comprising a common and country-specific component, while the time-specific component is added as a dummy variable in the macroeconomic block to represent the post-COVID period; $\varepsilon_{IDn,t}$ is the error term; β^i, γ^k, δ^m, θ^j are coefficients that measure the association between the dependent variable and explanatory variables in the corresponding blocks.

The group of macroeconomic variables consists of four indicators and a post-COVID dummy that captures time-specific effects in the post-pandemic period. The selection of the four macroeconomic indicators is based on the reviewed macroprudential models and on data for a broad cross-country sample and includes log-transformed geometric averages for real GDP growth and consumer price inflation, as well as log differences for the unemployment rate and a debt burden indicator measured as the ratio of private sector credit to GDP. These variables describe changes in the macroeconomic environment and are expected to be associated with changes in NPLs. To account for the lagged transmission between macroeconomic conditions and credit risk, the macro indicators are constructed over a three-year window around the survey dates, whereas the dependent variable for NPLs reflects changes over the two most recent years in the window of three years around the survey dates. The sources for the macroeconomic indicators include the World Bank's World Development Indicators (World Bank, 2024), the IMF World Economic Outlook (April 2024) (IMF, 2024), the Global Innovation Index 2023 (WIPO, 2023), and IMF country reports, national central bank publications (Canada, San Marino), listed in order of priority.

To describe the general institutional development, we rely on the World Bank's Worldwide Governance Indicators (World Bank, 2023b) (The datasets are available at URL: https://www.worldbank.org/en/publication/worldwide-governance-indicators), which include six dimensions of governance, of which three are considered most relevant in the context of credit markets: Rule of Law, Regulatory Quality, and Government Effectiveness. These variables are constructed as the arithmetic averages of the annual scores over the three years around the survey dates. In addition, we supplement this group of variables with a dummy variable for EU jurisdictions, reflecting their significant institutional similarities.

To describe the corporate credit segment, we rely on indicators from the World Bank Doing Business Index (World Bank, 2020), which consists of ten dimensions with multiple indicators in each dimension. For our context, we identify four indicators as most relevant: two indicators from the Getting Credit dimension – Strength of Legal Rights that captures secured transactions frameworks and Depth of Credit Information. The other two indicators are the Cost of Claim (as a percentage of claim value) from the Enforcing Contracts dimension and the Insolvency Framework indicator from the Resolving Insolvency dimension. Given the inertia of business environment conditions and the discontinuation of Doing Business indicators after 2020, our study uses the indicators with a two-year lag relative to the survey dates. Accordingly, the 2015 indicators are matched to the 2017 FICP survey and the 2020 indicators to the 2022 FICP survey.

The final group of explanatory variables is central to our analysis, as it describes distinct FCP policy choices with nine indices constructed from two waves of the World Bank FICP survey of national regulators. These indices represent institutional settings relevant to the household credit segment (Murina, 2025); the summary results for a balanced panel of 84 countries are presented in Annex A.

RESULTS

Based on the reviewed macroprudential studies and the theorized relationship between changes in NPLs and institutional indicators, we have collected an unbalanced panel dataset comprising 23 indicators for two time points and 113 countries. The summary statistics for the dataset are presented in *Table 5*.

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Table 5. Summary for panel data variables for 113 countries and two periods. *(Source: Author's estimation in Stata/BE18 by the summarize command)*

Full and short name		Obser-va-tions	Mean	Standard de-viation	Minimum	Maximum
1. Log-dif of NPL ratio [1]	NPL	226	-11.40	39.82	-151.63	116.26
2. Real GDP growth rate [2]	GDP	226	3.79	2.51	-8.70	16.44
3. Consumer price inflation [2]	CPI	226	5.72	6.23	-0.18	59.59
4. Log-dif of private sector credit to GDP [3]	Debt	223	-6.53	18.38	-61.79	78.82
5. Log-dif of unemployment rate [3]	Unem	226	-15.60	26.13	-110.63	70.10
6. COVID-19 dummy	COVID	226	0.50	0.50	0.00	1.00
7. EU dummy	EU	226	0.20	0.40	0.00	1.00
8. Rule of law [4]	ROL	226	0.12	0.89	-1.77	2.02
9. Government effectiveness [4]	GEF	226	0.19	0.84	-1.44	1.94
10. Regulatory quality [4]	RQU	226	0.21	0.84	-1.36	2.17
11. Strength of legal rights [5]	SLR	226	44.56	26.29	0.00	100.00
12. Cost of enforcement [5]	ENF	226	67.61	15.05	0.00	89.20
13. Depth of credit information [5]	DCI	226	73.56	31.96	0.00	100.00
14. Insolvemncy resolution [5]	INS	226	51.25	20.89	0.00	93.85
15. Financial inclusion [6]	FI	191	0.64	0.27	0.00	1.00
16. Financial literacy [6]	FL	189	0.48	0.31	0.00	1.00
17. Disclosure requirements [6]	DR	192	0.62	0.27	0.00	1.00
18. Credit reporting [6]	CR	197	0.57	0.38	0.00	1.00
19. Affordability [6]	AF	196	0.64	0.30	0.00	1.00
20. Credit price regulation [6]	CP	197	0.71	0.45	0.00	1.00
21. Fair treatment [6]	FT	192	0.72	0.32	0.00	1.00
22. Dispute resolution [6]	DS	196	0.66	0.31	0.00	1.00
23. Regulatory capacity [6]	RC	194	0.64	0.25	0.00	1.00

Indicators for each country were calculated according to the following rules:

- [1] log-difference in the NPL ratio over the survey year and the consequent year;
- [2] log-transformed geometric average over three years around the survey date;
- [3] log-difference in indicator levels over three years around the survey date;
- [4] arithmetic average over three years around the survey date;
- [5] annual indicator with a two-year lag relative to the survey date;
- [6] index score based on responses in the FICP survey.

We begin the data analysis by testing for pairwise correlations. The results in Annex B reveal a high level of correlation among the three indicators of general institutional development: Rule of Law, Government Effectiveness, and Regulatory Quality. We reduce the specification by excluding the two highly correlated indicators and retaining Rule of Law as the most general and directly relevant indicator for credit markets. Further testing for multicollinearity will be based on the Variance Inflation Factor (VIF), obtained with *the Stata* command *vif*.

First, we conservatively estimate a model with the lowest risk of misspecification – the fixed-effects (FE) model ($xtreg \ldots, fe$) and perform the post-estimation test for groupwise heteroscedasticity (*xttest3*), which is statistically significant and rejects the homoskedasticity hypothesis (p-value=0.0000). We repeat the FE estimation with cluster-robust standard errors ($xtreg \ldots, fe\ vce(cluster\ IDn)$). This model is statistically significant overall (F(19, 100) = 2.47, p-value=0.0020), and the within R^2 indicates that the model explains about 34% of the variation in NPL dynamics.

To assess whether cross-country differences can be modelled using an alternative estimation method, random-effects (RE), we consider the Hausman test (StataCorp, 2023a, pp. 1027-1031) and the Mundlak test (StataCorp, 2023b, pp. 531-538). We prioritize the Mundlak test because it is compatible with cluster-robust standard errors, whereas the Hausman test is not. Neither test rejects the possibility of the RE method for our dataset (Hausman p-value=0.87; Mundlak p-value=0.39). Therefore, we complement the FE estimation with the RE estimation, both with cluster-robust standard errors.

Second, we estimate the RE model using the generalised least squares (GLS) estimator with cluster-robust errors ($xtreg\ \ldots, re\ vce(cluster\ IDn)$). The RE-GLS model is statistically significant overall (Wald chi2(20) = 72.11, p-value=0.0000), explaining approximately 34% of the total variation in NPL dynamics, with 23% attributable to within-country and 41% to between-country variation. The error-variance decomposition indicates that the dominant share of the unexplained variation arises from idiosyncratic time-varying shocks, such as COVID-19 (sigma_e = 31.73, 91.5% of total unexplained variance), whereas time-invariant differences across countries account for only a small share (sigma_u=9.65, 8.5% of total unexplained variance).

Third, maximum likelihood (ML) is an alternative estimator for the RE model, preferred in cases like ours, because it provides higher efficiency for relatively small samples (Fitzmaurice, Davidian, Verbeke, & Molenberghs, 2009, p. 45). We estimate the RE-MLE model using the Stata command $xtreg\ \ldots, mle\ vce(cluster\ IDn)$. Also, the ML estimator allows comparison of competing specifications using the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and corrected AIC (AICc), which is preferred for relatively small samples (StataCorp, 2023a, p. 701) like ours. The competing specifications replace Rule of Law with Government Efficiency or Regulatory Quality in the block of general institutional indicators. The results do not support any changes to the original specification, as the first substitution does not improve the information criteria, while the second one worsens them. We also examined all statistically insignificant control variables and concluded that excluding any of them does not improve the model, supporting their retention.

Fourth, we consider the pooled OLS estimation method, which may be appropriate when panel-specific effects are not statistically significant. It is tested using the Breusch-Pagan Langrangian multiplier test (xttest0 after RE-GLS). The test is insignificant (p-value=0.31), indicating appropriateness of pooled OLS. The estimated model ($reg\ \ldots, vce(cluster\ IDn)$ is statistically significant (F(20,100)=3.75, p-value=0.0000) with 34% of the variation in the dependent variable explained. The multicollinearity test (vif) does not raise concerns (the highest vif is 2.13). The Ramsey test for model misspecification (estat ovtest) is also supportive of this specification (p-value=0.41).

Fifth, we estimate the model using PCSE, which is experimental in our case, given the short panel and relatively small sample. In the error structure specification, we account for only group-wise heteroscedasticity, which was previously tested and identified. Other potential error term structures (serial correlation and cross-sectional dependence) could not be reliably tested and empirically justified. The estimated model ($xtpcse\ \ldots, correlation(independent)\ hetonly$) is statistically significant (Wald chi2(20) = 73.66, p-value=0.000) and its results complete the set of estimated panel models for further interpretation.

Sixth and seventh, to explore differences in relationships between explanatory variables and the dependent variable across periods (pre-COVID and post-COVID), we propose two separate cross-sectional estimations for the 2017 and 2022 survey periods, respectively. Both cross-section models are statistically significant and have higher explanatory power than the panel models: 47% for 2017 and 43% for 2022. However, the Ramsey test for model misspecification supports the 2017 model (p-value=42) and indicates specification concerns for the 2022 model (p-value=0.01), which is likely attributable to increased uncertainty during the post-COVID period.

Thus, we have five panel model estimation results and two cross-section estimation results summarized in *Table 6*. Among the panel models, the within model (FE-GLS) identifies coefficients exclusively from within-unit (over time) variation. The remaining four panel models (RE-GLS, RE-MLE, pooled OLS, PCSE) identify coefficients using a combination of within- and between-unit variation. For convenience, we refer to this group as time-cross-sectional models.

Table 6. Summary estimation results for panel cross-section datasets. Note: the coefficients are reported with standard errors in parentheses. Considering the exploratory purpose of the study in terms of effect size and direction rather than strict hypothesis rejection and the evaluated balance between false-positive and false-negative errors for our relatively small sample size (reference to Annex C: Justification for significance ranges), we adopt non-conventional, relaxed significance thresholds *** p < 0.1; **p < 0.2, *p < 0.3.

		FE GLS	RE GLS	RE ML	PooledOLS	PCSE	OLS-2017	OLS-2022
1	GDP	-5.88*** (3.16)	-4.67*** (1.38)	-4.59*** (1.27)	-4.59*** (1.35)	-4.59*** (1.21)	-3.25** (2.35)	-4.14*** (1.69)
2	CPI	-0.27 (1.26)	0.30 (0.41)	0.31 (0.37)	0.31 (0.40)	0.31 (0.38)	1.91*** (0.83)	-0.04 (0.34)
3	Debt	-0.22 (0.29)	0.17 (0.17)	0.18* (0.16)	0.18* (0.17)	0.18* (0.16)	0.29** (0.18)	0.27 (0.34)
4	Unem	0.10 (0.17)	0.17*** (0.10)	0.18*** (0.09)	0.18*** (0.10)	0.18** (0.11)	0.02 (0.16)	0.36*** (0.18)
5	COVID	23.60*** (9.12)	17.06*** (6.62)	16.85*** (6.20)	16.85*** (6.59)	16.85*** (6.10)	(.)	(.)
6	EU	(.)	-12.37*** (6.86)	-12.70*** (6.41)	-12.70*** (6.81)	-12.70*** (6.42)	-14.49** (9.40)	-17.54** (11.00)
7	ROL	-45.22** (29.35)	6.32** (3.99)	6.41*** (3.74)	6.41** (3.98)	6.41** (3.91)	6.39** (4.84)	10.57** (6.31)
8	SLR	-0.66*** (0.26)	-0.26*** (0.11)	-0.25*** (0.10)	-0.25*** (0.11)	-0.25*** (0.11)	-0.29*** (0.15)	-0.29*** (0.17)

(continued on next page)

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Table 6. Continued.

		FE GLS	RE GLS	RE ML	PooledOLS	PCSE	OLS-2017	OLS-2022
9	ENF	0.05 (1.70)	-0.48*** (0.27)	-0.48*** (0.25)	-0.48*** (0.27)	-0.48*** (0.22)	-0.45** (0.28)	-0.34 (0.43)
10	DCI	0.19 (0.28)	0.38*** (0.12)	0.38*** (0.11)	0.38*** (0.12)	0.38*** (0.12)	0.30*** (0.14)	0.45*** (0.19)
11	INS	-0.50 (0.66)	-0.41*** (0.16)	-0.41*** (0.15)	-0.41*** (0.16)	-0.41*** (0.16)	-0.62*** (0.20)	-0.25 (0.27)
12	FI	39.09*** (18.79)	20.66** (12.95)	19.67** (12.14)	19.67** (12.91)	19.67*** (10.54)	20.35** (12.44)	23.33 (23.84)
13	FL	-12.71 (17.78)	-19.22** (12.93)	-19.48** (12.13)	-19.48** (12.89)	-19.48*** (11.11)	-20.46** (15.38)	-18.37 (18.62)
14	DR	-11.77 (21.94)	1.00 (10.14)	1.14 (9.37)	1.14 (9.96)	1.14 (9.40)	6.64 (11.90)	1.12 (17.49)
15	CR	-14.94 (16.74)	-16.62*** (7.29)	-16.70*** (6.73)	-16.70*** (7.16)	-16.70*** (7.07)	-18.90*** (8.71)	-13.02 (13.68)
16	AF	-5.13 (21.87)	3.46 (9.42)	3.78 (8.76)	3.78 (9.32)	3.78 (8.93)	-13.23* (11.88)	19.83 (17.73)
17	CP	6.51 (10.91)	8.95** (6.61)	9.16** (6.24)	9.16** (6.63)	9.16** (6.13)	-3.26 (7.25)	21.39** (13.32)
18	FT	5.33 (19.92)	3.25 (10.91)	3.43 (10.31)	3.43 (10.96)	3.43 (10.17)	10.90 (13.49)	12.46 (19.39)
19	DS	26.51* (24.02)	10.27* (9.64)	10.28* (9.07)	10.28* (9.64)	10.28 (10.09)	6.74 (14.29)	20.97* (18.40)
20	RC	-45.21** (27.70)	-37.10*** (12.15)	-37.08*** (11.45)	-37.08*** (12.17)	-37.08*** (11.53)	-17.14* (14.02)	-67.18*** (25.86)
21	_cons	49.44 (111.30)	49.42 (25.56)	49.04 (23.86)	49.04 (25.36)	49.04 (22.10)	55.70 (33.26)	30.78 (44.72)
22	N	175	175	175	175	175	89	86
23	R-sq	0.34	(.)	(.)	0.34	0.34	0.47	0.43

The estimation results show robust outcomes for all time-cross-sectional models, while some differences are observed for the within model and the cross-sectional models. The differences between time-cross-sectional models and the within model are expected, since the models evaluate different sources of variation: mixed over time and cross-section versus only within-unit over-time variation. The differences between time-cross-sectional models and the two cross-sectional models indicate that the relationships may change in times of high uncertainty (post-COVID). The interpretation of the estimated coefficients follows this structure of the three model types.

All the estimated models are statistically significant and provide substantial material for macroprudential analysis and for the specific objective of this study – the empirical assessment of FCP policy choices. The discussion is organized around four groups of explanatory variables: macroeconomic variables, variables for the general institutional development, variables for the corporate credit segment, and, finally and most importantly, FCP indices, representing institutional conditions in the household credit segment.

The estimated models include five macroeconomic indicators, selected based on relevance for the objectives of our study and data availability for the broad geographical and income-level sample of countries. The results provide evidence for the importance of all the selected indicators, even though some of them lack statistical significance individually (their exclusion leads to inferior model specifications).

The log-transformed average real GDP growth rate is statistically significant in all estimations, indicating that it is an important contributor to explaining changes in NPL ratios. The relationship is negative. According to the within model, 1 p.p. acceleration in GDP growth between two periods within a country is associated with 5.9 p.p. lower growth in NPLs. Meanwhile, the time-cross-sectional panel models indicate that a 1 p.p. higher GDP growth rate is associated with 4.6-4.7 p.p. lower growth in NPLs. The negative association also holds in each cross-sectional model. Thus, across all specifications, higher GDP growth is robustly associated with improved NPL performance, i.e., NPLs rise less and fall more.

The log-transformed average consumer price inflation shows a negative association in the within model and a positive association in all time-cross-sectional panel models, although none of these estimates are statistically insignificant. The difference in signs may suggest that an acceleration in inflation over time is likely associated with lower growth in NPLs (booming period), whereas countries with persistently higher inflation are likely associated with higher NPL growth. The cross-sectional estimation for 2017 provides the only statistically significant coefficient for inflation, indicating that during a relatively favourable economic period before the pandemic, countries with higher inflation were also likely to have higher NPL growth. By contrast, in the post-pandemic period, the slope coefficient is close to zero, suggesting no evidence of the relationship. A similar interpretation applies to the indicator of the log-difference private sector debt burden to GDP, except for the improved statistical significance and the relative stability of the positive association in the cross-sectional models.

The log-difference of the unemployment rate has a positive association in all estimated models, indicating that higher unemployment is associated with higher growth in NPLs. The relationship is statistically significant in all panel models except the within model. The cross-sectional estimates suggest that in the pre-pandemic period, the relationship was weak, while in the post-pandemic period it became stronger and statistically significant.

COVID is a time-specific dummy for the post-pandemic period and shows a statistically significant association with higher NPL growth in all the estimated panel models.

The group of indicators describing general institutional development includes two items. The dummy variable for EU jurisdictions is statistically significant in all estimated models and shows a negative relationship with NPL growth, i.e., EU jurisdictions have, on average, lower growth in NPLs. The Rule of Law variable has moderate statistical significance and a sign reversal between the within model and all other models. The within model indicates that a policy shift with a unit increase in the Rule of Law indicator is associated with a 45 p.p. lower growth of the NPL ratio. Meanwhile, all other models show a positive association, though at a relatively low magnitude of about 6 p.p., except for the 2022 cross-sectional model with 11 p.p. This reversal may reflect that an improvement in the legal system has a short-term, significant favourable effect on NPL dynamics, whereas having a relatively stronger legal system may be associated with slightly higher measured NPL growth due to its faster and fuller recognition and its slower resolution that carefully takes into account the interests of all involved parties.

The next group of regressors represents four indicators for the corporate credit segment. They show overall robustness across all the time-cross-sectional models. Strength of Legal Rights (in secured transactions), Cost of Claim, and Insolvency Resolution have negative associations, indicating that higher scores are associated with lower growth in NPL ratios. Specifically, Cost of Claim has the largest coefficient, while Strength of Legal Rights has the lowest among these three explanatory variables. Only the Depth of Credit Reporting has a positive association, which may be explained by earlier and more comprehensive NPL recognition: given an effective credit-reporting infrastructure, distressed corporate loans are identified sooner and, due to cross-default provisions, are recognised across multiple creditors. In the within model, only the Strength of Legal Rights has a statistically significant policy shift effect that is associated with lower growth in NPL ratios. In the cross-sectional estimations, Cost of Claim and Insolvency Resolution lose statistical significance in the post-COVID period, possibly due to widespread forbearance measures and overall increase in uncertainty.

The final group represents the core interest of our study and describes FCP policy choices of national regulators using nine distinct indices. The estimation results of all time-cross-section models indicate robust relationships for five FCP indices: positive associations for Financial Inclusion and Credit Pricing, and negative associations for Financial Literacy, Credit Reporting, and Regulatory Capacity. The other four indices are not significant in any of the estimated models: Disclosure Requirements, Affordability Testing, Fair Treatment, and Dispute Resolution. This lack of statistical significance does not imply that these policy choices are unimportant; rather, it indicates that with our highly restrictive settings of relatively small sample size, only two time points, and a narrow focus on NPLs as a negative indicator of well-being, we did not find evidence of a relationship. At the same time, these four policy choices may still be relevant in other empirical contexts and specifically for a broader consideration of households' well-being that we cannot measure for this study.

We begin with the two indices with estimated positive associations. Financial Inclusion index (FI) describes policy choices with responses to three questions: (1) existence of a national strategy to promote financial inclusion, (2) conducting surveys to measure financial inclusion, (3) implementation of practical regulatory steps aimed at increasing financial inclusion such as: basic products and other requirements, tax incentives, subsidies, priority lending, mandated account opening for recipients of government transfers. Positive responses to all three questions increased between the 2017 and 2022 surveys. The national strategy component had the highest rate of positive responses (74% in 2017 and 90% in 2022 across the fixed sample of 84 countries that participated in both surveys), followed by the measurement question (65% and 71%), while the government practical steps showed the lowest rate (44% and 47%) (Murina, 2025, pp. 60-62). This pattern suggests that the third component is likely to be the key source of differences between countries, while the first component drives the changes between the periods. Interestingly, the index components and the total score are relatively higher for lower-income groups.

Across all estimated models, the FI index demonstrates a stable positive association with changes in the NPL ratio. Within the within model, the estimated coefficient indicates that a one-unit increase in the index is associated with a 39-p.p. increase in the change in NPL ratio, i.e., a faster growth or a slower decline in the ratio – both should be perceived as a deterioration in NPL dynamics. In the 2017 cross-section, the FI index remains positive and significant, while in 2022, its significance weakens, likely due to the increased uncertainty of the post-COVID period.

To further understand the drivers behind these patterns, the three components of the index were examined individually by re-estimating the models with each component replacing the index. The results indicate that the positive relationship is largely driven by the component of implementing practical policies aimed at financial inclusion, while the national strategy component plays a more moderate role, and the measurement component is not significant.

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Taken together, the findings indicate that the positive association between FI index and changes in NPL ratio is statistically relevant and robust across the estimated models, with the largest magnitude in the within model and weakened significance in the post-COVID period. The positive association constitutes an unfavourable finding from the NPL-oriented policy perspective and motivates further inquiry into the underlying mechanisms. For example, one possibility is that government efforts to increase financial inclusion may contribute to the expansion of non-affordable lending, or that progress in inclusion is assessed too narrowly through simple penetration metrics rather than indicators of consumers' financial well-being. In this context, special attention should be paid to the third component of the index, which reflects government interventionist policies, as it appears to be the primary driver of the estimated positive association.

The next index with a positive association describes policies that limit credit pricing, such as interest rate caps or maximum allowable spreads – the Credit Pricing index (CP). The index is constructed based on responses to a single question and is binary by design: a maximum score is assigned if any type of financial institution, with respect to any type of loan, is subject to such restrictions. The selective application of the credit-pricing restrictions may be justified as a form of targeted market interventions in segments where the risks are higher. Although selectivity can create opportunities for regulatory arbitrage, we do not view it negatively, but rather as a sign of a more cautious and deliberate approach to market intervention. For the fixed sample of 84 counties, the index score increased slightly between the surveys from 0.70 in 2017 to 0.74 in 2022. The score is relatively higher for higher-income country groups (Annex A).

The CP index coefficient is statistically insignificant in the within model and in the 2017 cross-sectional model, indicating no evidence of a relationship either in a policy shift context or during the relatively good pre-crisis period. In the 2022 cross-sectional estimation, the coefficient becomes positive, statistically significant, and exhibits the highest magnitude among all estimated models. This result suggests that countries with credit-price restrictions experience unfavourable NPL dynamics during the post-crisis period, i.e., likely a faster increase in the NPL ratio. A similar, but approximately twice as small, positive association is also observed in all time-cross-section models, which is likely influenced by the variation in the 2022 period. This finding is concerning and calls for further examination. One possible explanation relates to the intended purpose of credit-price restrictions, namely, to limit high-risk lending. If the policy is effective, then countries imposing such restrictions may indeed have fewer high-risk loans and therefore lower NPL ratios before shocks. During a crisis, idiosyncratic risk materialises across all loan portfolios. Countries that enter the crisis with a lower initial NPL level may then exhibit larger relative changes in NPLs, even if the absolute deterioration is comparable (a denominator or low-base effect). This interpretation aligns with the fact that the 2022 cross-sectional variation is the primary contributor to the estimated positive relationship. Importantly, the proposed explanation does not undermine the objectives of the credit-price restrictions. Rather, it highlights that post-crisis cross-sectional dynamics may generate a positive association without implying that the policy itself worsens credit quality. A similar mechanism may also apply to the Affordability index, which is insignificant in all panel models and shows weak statistical significance in both cross-sectional models, but with coefficients of opposite signs. Theoretically, this pattern may arise in the index, which contributes to improved NPL dynamics in relatively good times by restricting high-risk lending and thereby reducing the NPL level. However, during periods of economic stress, countries with lower NPL levels may exhibit faster relative growth of NPLs simply because of the lower denominator. We cannot confirm this theoretical proposition with the available data and leave it for further research.

Next, we turn to the three indices that show negative associations with changes in the NPL ratio. The first is the Financial Literacy Index (FL), which describes policies aimed at increasing consumers' financial literacy and capability. The index integrates responses to five questions:

1. Mapping the financial education efforts of different stakeholders.
2. Conducting a nationwide measurement of financial capability.
3. Issuing guidelines on content and approaches to financial education.
4. Requiring financial institutions to provide financial education.
5. Maintaining a website to improve public financial capability.

Overall, the positive response rate is relatively low. For the fixed sample of 84 countries, the index increased from 0.45 in 2017 to 0.52 in 2022 (Annex A). By component, the lowest rate of positive responses is for the requirements imposed on financial institutions (0.20 and 0.27), while the highest rate is for maintaining a website with educational content (0.56 and 0.61). The fastest progress is observed for the guideline-related question (0.35 and 0.63), whereas a decline is recorded in the measurement component (0.60 and 0.47). There is no clear pattern in index values by income group or region (Murina, 2025, pp. 62-64).

The estimated coefficient for the FL index is statistically insignificant in the within model, which may reflect limited variability in the index between the two survey waves and, therefore, an inability to detect policy-shift effects. At the same time, all four time-cross-sectional models indicate a negative association, with stable coefficient magnitudes and moderate statistical significance. Notably, the two cross-sectional models also produce negative coefficients of similar size, although statistical significance weakens to the marginal level in the post-COVID period. Further, we examined the possible drivers of the association by replacing the FL index with its five underlying components in the baseline models. The third component - issuing guidelines on content and approaches to financial education - emerged as the most important contributor. It has the largest estimated coefficients among all components, remains robust across the models, and exceeds half the magnitude of the coefficients for the FL index. The other components also display negative associations in all time-cross-sectional models. Specifically, the first component on mapping and the fifth component on maintaining a web-side have negative associations with magnitudes approximately half that of the third component, whereas the second component on the measurement and the fourth on the requirements have very small coefficients. Taken together, these results represent a favourable finding for financial literacy policy choices. They suggest that efforts invested in financial literacy are likely associated with improved NPL dynamics, i.e., slower increase and faster reduction in the NPL ratio. Issuing guidelines on content and approaches to financial education emerged as the most important drivers, followed by the mapping component and maintaining an educational website component.

The second FCP index with a negative association is Credit Reporting (CR). It is constructed from responses to a single question and describes whether financial institutions have access to a credit bureau or a credit registry and whether financial institutions are required to report to them. For the fixed sample of 84 countries, the index increased from 0.46 in 2017 to 0.69 in 2022 (Annex A). There are no clear distribution patterns in the index average value by income group or region. The estimation results for the CR index are relatively robust across the models, with only weakened statistical significance in the within and the post-COVID cross-sectional models. This finding is favourable for FCP credit-reporting policies, suggesting that the existence of credit-reporting infrastructure and mandatory screening and reporting requirements constitute sound policy steps for improving NPL dynamics, likely because they support better borrower selection and strengthen discipline by increasing the incentives to avoid negative records in credit registries. This mechanism appears particularly strong in economically good pre-COVID periods, as evidenced by the higher statistical significance of the cross-sectional results for that period. By contrast, another variable in our specification, the Depth of Credit Information from the Doing Business index describing the corporate credit segment, shows a positive association with changes in the NPL ratio. This relationship likely reflects a different mechanism: faster and more comprehensive NPL recognition due to cross-default information sharing, along with longer recovery from defaults. This mechanism appears stronger in post-COVID periods characterized by high uncertainty. Thus, the two credit-reporting indicators may exhibit opposite associations because they operate through different mechanisms and in different segments of credit relations.

The third FCP index with a negative association is Regulatory Capacity (RC). The index is an aggregate of responses to three questions: (1) whether a FCP unit /team exists and how it is organized, (2) the scope of FCP regulatory powers with a list of seven items, and (3) the scope of FCP activities with a list of eleven items. It is important to note that scoring for the first question specifically emphasizes whether the FCP unit/ team is separate from prudential supervision functions, and if so, whether it is on equal hierarchy or lower than the prudential supervision functions. In the scoring, responses indicating a separate unit at a hierarchy equal to prudential supervision receive the highest score of 1, a separate unit at a lower hierarchy receives 0.5, an FCP unit embedded within prudential supervision is assigned 0.25, and the absence of a separate FCP unit receives 0. This scoring reflects our interpretation of the G20/ OECD high-level principles on effective FCP frameworks, which highlights that those responsible authorities should have operational independence, adequate powers, and sufficient resources to fulfil the FCP mandate (OECD, 2022, p. 5). For the other two questions, the scoring reflects the proportion of powers and activities applicable to a regulator relative e to the full list. The positive response rate only slightly changed from 0.63 in 2017 to 0.69 in 2022. Among the components, the question on regulatory powers shows relatively higher average scores (0.70 in both waves), whereas the question on FCP unit arrangements has lower scores (0.58 and 0.67) (Murina, 2025, pp. 73-75). Countries in higher-income groups are likely to have higher RC index scores.

The estimated RC coefficients have relatively high statistical significance in all estimated models and show the largest negative magnitude among all 9 FCP indices. The most conservative within model indicates that a one-unit increase in the RC index improves NPL dynamics by 45 p.p., i.e., a slower increase or faster reduction in the NPL ratio. The four time-cross-sectional models produce an almost identical coefficient of 37 p.p. with high significance, confirming that the institutional setup of the FCP unit matters substantially. The two cross-sectional models supplement the finding, suggesting that the regulatory capacity becomes even more critical in periods of uncertainty, with a much higher RC coefficient in the post-COVID period compared to the pre-crisis period. Our examination by component of the RC index indicates that all

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three components are meaningful contributors to the aggregate result, although the second component – regulatory powers – has a relatively higher contribution. It includes powers to issue warnings to financial institutions, imposing fines and sanctions, applying administrative sanctions to management, publishing information about violations, requiring institutions to refund fees and charges, requiring the withdrawal of misleading advertising, and revoking or recommending revocation of a licence. The component describing the scope of FCP activities has the second largest contribution and includes mystery shipping (incognito testing), consumer research, on-site and off-site inspections of financial institutions, thematic reviews, issuing regulations, market monitoring, collection and analysis of consumer-complaint data, accepting consumer complaints, and financial education.

Countries where the FCP unit is empowered with most of these powers, conducts most of these activities, and operates independently with adequate resources are likely to experience more favourable NPL dynamics – slower increases and faster reductions in NPL ratios.

A key finding of this analysis is that the proposed three groups of institutional variables substantially improve the explanatory power of NPL dynamics, with the third group of FICP indices being the largest contributor. Within the within model specification, R2 increases from 0.26 to 0.34, while in the pooled OLS model, R2 increases from 0.24 to 0.34 after including the FICP indices. Because these are nested specifications estimated on the same sample, the increase in R2 reflects additional variation in NPL dynamics explained by FCP policy choices – variation not captured by macroeconomic, general institutional, or corporate segment institutional variables.

DISCUSSION

Taken together, our findings can be contrasted with the only two other studies that have used FICP responses to describe and evaluate FCP policy choices in an international context: Kriese et al. (2019) on GDP growth and Pasiouras (2018) on NIM, from which several similarities and differences emerge. First, financial inclusion, financial literacy, credit reporting, and credit pricing were not examined explicitly as explanatory variables in these two studies. Our findings complement Kriese et al. (2019) in identifying the relevance of enforcement regulation and responsible lending, and not finding evidence for disclosure requirements in both studies. However, unlike their results, we do not observe significant associations for fair treatment and dispute resolution, which they report as favourably associated with GDP growth.

In relation to Pasiouras (2018), the alignment is very limited and related only to the sub-sample of advanced economies. Our study aligns in support of the relevance of supervisory powers, but diverges in finding evidence for disclosure, fair treatment, and dispute resolution, which have favourable negative associations with NIM.

At the same time, for the sub-sample of developing economies, the associations with NIM for all FCP variables are positive – a disadvantageous outcome for the consumers. Overall, these differences may partly reflect the use of different dependent variables, discrepancies in how the FCP indicators were selected and constructed, or differences in the datasets. Rather than the differences themselves, the attention should be on identifying where the estimated associations imply unfavourable consumer outcomes – such as the potential trade-off between inclusion and credit quality in our study or the positive associations with NIM for the developing countries in Pasiouras (2018) – and on generating evidence for informed and justified policy interventions.

CONCLUSIONS

The primary objective of this study was to examine whether and how FCP policy choices are associated with changes in the NPL ratio, given that NPLs are among the most detrimental outcomes from financial services for consumer well-being and, when accumulated, destructive for the social pillar of sustainable development. Using a panel dataset of 113 countries observed over two time points, we estimated seven econometric models that capture different sources of variation: within-unit time variation (FE GLS), mixed time-cross-sectional variation (RE OLS, RE MLE, pooled OLS, SPCE), and purely cross-sectional variation during the relatively stable pre-COVID period and the high-uncertainty post-COVID period (two OLS models). Across these models, we confirmed the relevance of the proposed specification, which includes five macroeconomic indicators, two general institutional indicators, four corporate segment institutional indicators, and nine FCP indices representing the household credit segment.

Overall, the models show that five out of nine FCP indices are statistically significant in explaining NPL dynamics, including two indices with positive associations and three with negative associations. In the most conservative within model, which allows policy shift analysis on NPL dynamics, only two indices are statistically significant: (1) Financial Inclusion index with

about 39 p.p. increase in growth of the NPL ratio - an unfavourable outcome from the policy perspective and (2) Regulatory Capacity index with 45 p.p. decrease in growth of the NPL ratio - a favourable outcome from the policy perspective.

In the most informative estimation models that capture all time-cross-section variation, the Regulatory Capacity index shows the highest magnitude of negative association with about 37 p.p. lower growth of the NPL ratio, followed by the Financial Literacy index (about 19 p.p. lower growth) and the Credit Reporting index (about 17 p.p. lower growth). These three indices with negative associations imply favourable outcomes from the policy perspective. The same models indicate that two FCP indices have positive associations: the Financial Inclusion index is associated with about 20 p.p. higher growth of the NPL ratio, and the Credit Pricing index with only about 9 p.p. higher growth. The positive association with the Financial Inclusion index across all models is an alarming finding, raising concerns about its impact on credit quality and the effectiveness of policy measures in promoting consumer well-being. At the same time, the positive association with the Credit Pricing index has a low magnitude and is mostly driven by cross-sectional variation in the post-COVID period, which may be explained by a low denominator effect.

The cross-sectional models for the economically good pre-COVID period and the high-uncertainty post-COVID period help to trace how the associations behave under different macroeconomic conditions. They show that the Financial Inclusion, Financial Literacy, and Credit Reporting indices have associations of similar magnitude in both periods, while the Regulatory Capacity exhibits stronger statistical significance and almost four-fold higher magnitude in the post-COVID period. In contrast, the Credit Pricing and Affordability index shows substantial differences between the two periods, including a change in coefficient signs. This pattern may reflect a more complex relationship influenced by a low-denominator effect, arising when the policies are effective in restricting high-risk lending in good times.

The obtained empirical results may contribute to more informed policy decisions, further evaluation of existing frameworks, and greater consideration of the potential trade-offs, such as the one between financial inclusion and credit quality. In particular, the identified associations point to the need for careful calibration of inclusion-oriented policies and for strengthening institutional capacity in the areas where negative associations were found. The findings also highlight the importance of a comprehensive approach to FCP dimensions and of integrating FCP considerations into broader macroprudential discussions, as these policies may influence credit-market outcomes.

The analysis is constrained by the short panel and the relatively small country sample for econometric estimation, even though the dataset provides broad international coverage. Further rounds of the FICP survey are needed to enable richer empirical designs, including dynamic analysis. In addition, survey-based indicators may contain measurement errors arising from a misunderstanding of the questions or a deficient familiarity with FCP concepts among respondents. We suggest additional quality-assurance procedures, extensive survey guidance, joint review of responses with national experts outside the regulator, and deeper engagement of regulators to ensure accurate reporting. A further concern is the possibility of overly positive self-reporting by regulators, which reinforces the need for validation mechanisms in future survey rounds.

Empirical evaluation of FPC policies should continue, taking into account their multidimensional nature and their ultimate goal – improving the financial well-being of citizens. Meanwhile, because internationally comparable measures of financial well-being are still under development, additional proxies can be used alongside NPLs to enhance the understanding of policy effects. Associations that appear undesirable from the policy perspective, such as between financial inclusion and growth in the NPL ratio, should be taken as signals that warrant careful investigation. Future research may explore the mechanisms behind these associations, examine how policy effects differ across economic cycles, and why countries differ in FCP regulatory effectiveness.

ADDITIONAL INFORMATION

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CONFLICT OF INTEREST

The Author declares that there is no conflict of interest.

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НЕПРАЦЮЮЧІ КРЕДИТИ Й ПОЛІТИКИ ЗАХИСТУ СПОЖИВАЧІВ ФІНАНСОВИХ ПОСЛУГ: ЕМПІРИЧНИЙ АНАЛІЗ НА ОСНОВІ ШИРОКОЇ МІЖНАРОДНОЇ ВИБІРКИ

У цьому дослідженні проаналізовано взаємозв'язок між політиками захисту споживачів фінансових послуг (ЗСФП) та непрацюючими кредитами (НПК) в широкому міжнародному контексті та виходячи з того, що НПК негативно впливають на добробут громадян і соціальний вимір сталого розвитку.

Дослідження використовує дев'ять індексів ЗСФП, які відображають окремі регуляторні напрями, розраховані на основі відповідей регуляторів на опитування Світового банку про фінансову інклюзію та захист споживачів фінансових послуг. Оціночна модель розширює стандартний макропруденційний підхід шляхом додавання інституційних показників загального середовища, корпоративного сегмента й сегмента домогосподарств, де останній представлений індексами ЗСФП і є основним фокусом дослідження. Оцінювання здійснене на незбалансованому панельному наборі даних для 113 країн за допомогою семи моделей: моделі фіксованих ефектів і двох допоміжних крос-секційних моделей, а також чотирьох панельних моделей зі змішаною часово-просторовою варіацією як основних специфікацій.

Результати свідчать, що два індекси ЗСФП мають несприятливі асоціації з динамікою НПК: фінансова інклюзія (помірна) та обмеження вартості кредитів (низька), – водночас три індекси демонструють сприятливі асоціації: фінансова грамотність (помірна), кредитне звітування (помірна) та регуляторна спроможність (висока). Чотири інші індекси – розкриття інформації, перевірка достатньої платоспроможності, справедливе ставлення та врегулювання спорів – не мають достатніх доказів асоціації зі змінами частин НПК. Фінансова інклюзія має асоціацію, яка викликає найбільше занепокоєння, оскільки її величина свідчить про потенційний компроміс між розширенням доступу до фінансових послуг і кредитною якістю, особливо в умовах слабких вимог до відповідального кредитування. Натомість асоціація індексу обмеження вартості кредитів є економічно незначною та може бути пояснена ефектом знаменника, зумовленим нижчим рівнем НПК в докризовий період.

Політики ЗСФП в частині фінансової грамотності, кредитного звітування та регуляторної спроможності мають стійку негативну асоціацію з НПК, що свідчить про сприятливі результати з погляду динаміки НПК. Можливих впливів політик ЗСФП, представлених іншими чотирма індексами, на добробут громадян це дослідження не заперечує, а їх невиявлення може бути пояснене й фокусом аналізу на непрацюючих кредитах, що відображають один із вимірів добробуту, і обмеженнями панельних даних, зокрема їхньою короткою тривалістю та невеликим обсягом.

Ключові слова: непрацюючі кредити, захист споживачів фінансових послуг, фінансова грамотність, фінансова інклюзія, регулювання фінансового сектора

JEL Класифікація: D18, G21, G28

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Annex A. FCP indices for 2017 and 2022 surveys and a balanced panel of 84 countries. *(Source: (Murina, 2025))*

	Financial inclusion (FI)		Financial literacy (FL)		Disclosure requirements (DR)		Credit reporting (CR)		Affordability (AF)		Credit pricing (CP)		Fair treatment (FT)		Dispute resolution (DR)		Regulatory capacity (RC)		Total, average	
	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022	2017	2022
Summary with key statistical indicators																				
Number of observations	84	82	80	81	82	84	84	84	83	84	84	84	83	84	84	84	84	83	83	83
Mean	0.61	0.70	0.45	0.52	0.60	0.63	0.46	0.69	0.61	0.67	0.70	0.74	0.70	0.78	0.67	0.71	0.63	0.69	0.60	0.68
Median	0.67	0.80	0.50	0.60	0.67	0.67	0.55	0.75	0.50	0.50	1.00	1.00	0.88	1.00	0.75	0.75	0.61	0.72	0.68	0.75
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.01	0.00
Maximum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Standard deviation	0.28	0.25	0.28	0.32	0.27	0.26	0.40	0.30	0.28	0.30	0.46	0.44	0.33	0.29	0.32	0.28	0.23	0.23	0.32	0.30
Average values by income-groups																				
High	0.58	0.63	0.49	0.52	0.62	0.67	0.40	0.67	0.60	0.68	0.82	0.82	0.79	0.81	0.75	0.76	0.65	0.73	0.63	0.70
Upper-medium	0.61	0.69	0.44	0.56	0.56	0.59	0.39	0.65	0.53	0.67	0.63	0.73	0.62	0.69	0.62	0.67	0.62	0.65	0.56	0.66
Lower-medium	0.66	0.81	0.37	0.49	0.63	0.64	0.67	0.75	0.74	0.68	0.63	0.63	0.70	0.86	0.63	0.68	0.61	0.70	0.63	0.69
Low	0.80	0.87	0.70	0.30	0.60	0.67	0.80	0.83	0.50	0.50	0.00	0.00	0.00	0.88	0.54	0.79	0.25	0.52	0.47	0.59
Average values by regional groups																				
Europe and Central Asia	0.53	0.66	0.45	0.50	0.64	0.70	0.32	0.72	0.59	0.61	0.73	0.79	0.71	0.76	0.63	0.67	0.64	0.72	0.58	0.68
Sub-Saharan Africa	0.71	0.75	0.39	0.31	0.47	0.56	0.44	0.73	0.54	0.67	0.50	0.33	0.51	0.78	0.67	0.77	0.59	0.72	0.53	0.62
Latin America and the Caribbean	0.54	0.72	0.43	0.71	0.58	0.58	0.63	0.67	0.56	0.75	0.75	0.81	0.79	0.82	0.70	0.69	0.53	0.59	0.61	0.71
East Asia and the Pacific	0.86	0.83	0.61	0.59	0.54	0.60	0.60	0.63	0.70	0.75	0.70	0.80	0.78	0.81	0.71	0.81	0.74	0.74	0.69	0.73
Middle East and North Africa	0.58	0.58	0.55	0.54	0.81	0.69	0.62	0.58	0.79	0.86	0.71	0.71	0.80	0.82	0.72	0.78	0.62	0.73	0.69	0.70
South Asia	0.67	0.60	0.10	0.46	0.63	0.50	0.37	0.67	0.70	0.60	0.80	1.00	0.50	0.63	0.72	0.57	0.65	0.62	0.57	0.63
North America	0.67	0.80	0.60	0.60	0.67	0.83	1.00	0.75	0.00	0.00	1.00	1.00	0.63	0.88	0.61	0.68	0.86	0.69	0.67	0.69

Annex B. Paired correlation coefficients for the panel sample of 113 countries. Note: estimation is conducted in Stata with correlate command.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
NPL	1.00																						
GDP	-0.29	1.00																					
CPI	0.15	-0.12	1.00																				
Debt	0.10	-0.03	-0.23	1.00																			
Unem	0.25	-0.30	0.04	0.06	1.00																		
COVID	0.04	0.25	0.32	-0.31	-0.20	1.00																	
EU	-0.22	-0.10	-0.12	-0.14	-0.21	0.01	1.00																
ROL	-0.12	-0.14	-0.26	-0.05	-0.16	0.01	0.52	1.00															
GEF	-0.14	-0.10	-0.30	-0.04	-0.20	0.02	0.48	0.95	1.00														
RQU	-0.15	-0.15	-0.31	-0.03	-0.21	-0.01	0.53	0.91	0.91	1.00													
SLR	-0.05	0.03	-0.02	0.07	-0.22	0.20	-0.03	0.06	0.09	0.19	1.00												
ENF	-0.19	-0.11	-0.04	-0.10	-0.13	-0.02	0.35	0.40	0.40	0.35	-0.24	1.00											
DCI	0.17	-0.08	0.00	0.09	-0.19	0.19	0.00	0.08	0.15	0.21	0.27	0.04	1.00										
INS	-0.19	-0.11	-0.18	-0.05	-0.23	0.13	0.40	0.59	0.63	0.67	0.29	0.24	0.24	1.00									
FI	0.14	-0.01	0.11	0.03	0.11	0.17	-0.13	-0.07	-0.03	-0.06	0.07	-0.21	0.14	0.05	1.00								
FL	-0.05	-0.07	0.05	0.04	-0.11	0.15	-0.01	0.06	0.13	0.15	0.08	0.01	0.30	0.22	0.39	1.00							
DR	0.00	-0.18	0.10	-0.02	-0.04	0.08	0.15	0.10	0.10	0.18	0.12	0.15	0.13	0.17	0.09	0.28	1.00						
CR	0.02	0.06	0.06	0.04	0.06	0.27	-0.10	-0.07	-0.07	-0.10	0.04	-0.07	0.24	-0.10	0.11	0.02	0.05	1.00					
AF	0.01	0.08	0.04	0.10	-0.11	0.10	0.02	-0.03	-0.01	0.00	-0.02	0.00	0.20	0.01	0.18	0.18	0.19	0.09	1.00				
CP	-0.02	-0.06	-0.09	0.09	-0.13	0.05	0.17	0.26	0.29	0.28	0.07	0.30	0.15	0.36	0.06	0.32	0.27	-0.02	0.07	1.00			
FT	0.02	-0.23	-0.06	0.08	-0.09	0.12	0.17	0.08	0.10	0.17	0.03	0.07	0.17	0.24	0.07	0.39	0.35	0.02	0.22	0.14	1.00		
DS	0.03	-0.13	0.11	0.03	-0.07	0.08	0.18	0.20	0.22	0.25	-0.06	0.08	0.24	0.30	0.22	0.33	0.29	0.00	0.30	0.15	0.44	1.00	
RC	-0.07	-0.10	0.09	-0.05	-0.03	0.18	0.12	0.17	0.22	0.18	-0.16	0.09	0.21	0.21	0.32	0.40	0.20	-0.07	0.34	0.16	0.31	0.52	1.00

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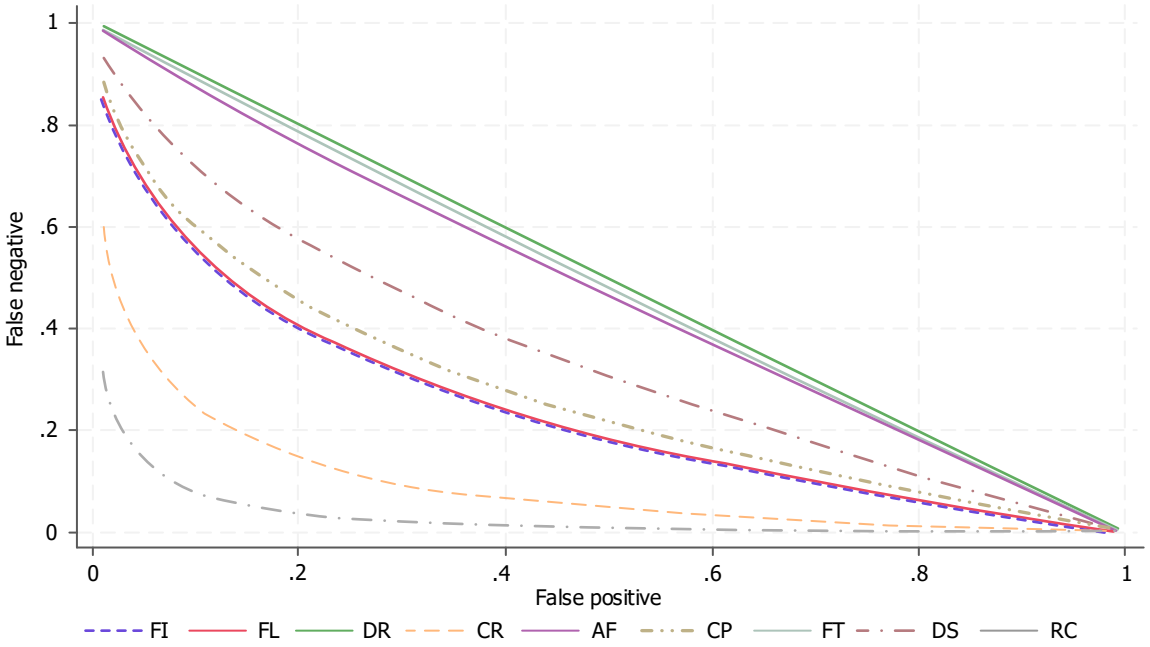

Figure 1. Trade-off between false positive (type I) and false negative (type II) errors for pooled OLS model with unbalanced sample of 113 counties.

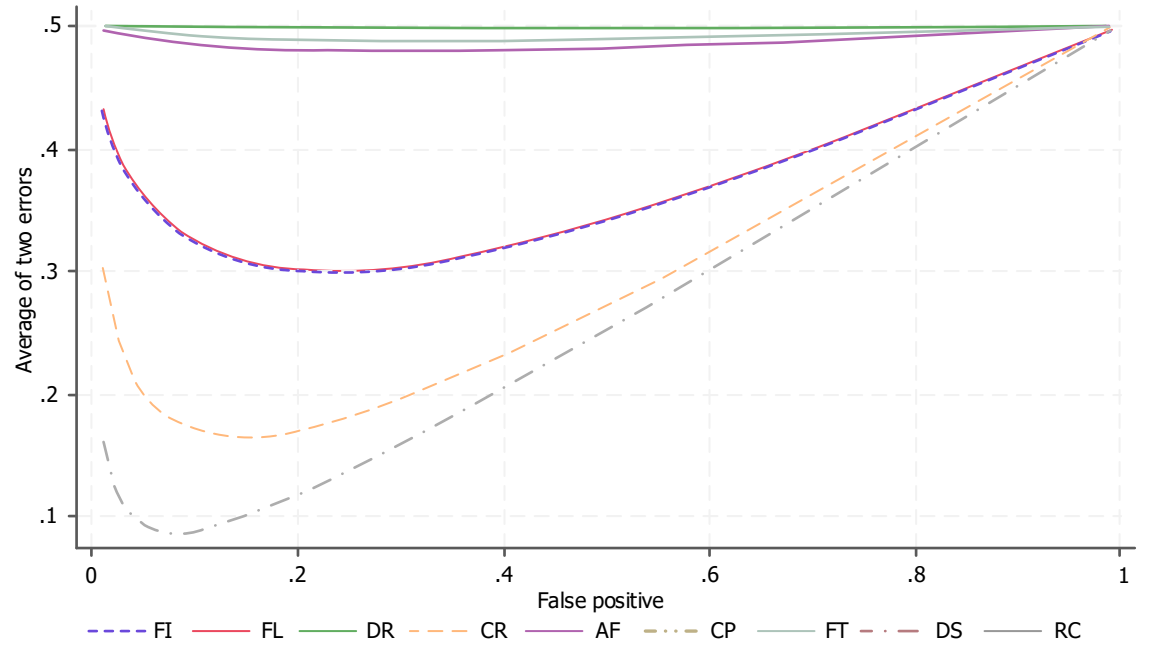

Figure 1. Equally weighted average false positive and false negative errors versus false positive (significance level).

*Comment: The charts represent the estimated false positive (Type I) and false negative (Type II) errors, as well as the trade-off between them (**Figure 1**). In our exploratory study of a relatively under-researched area, we prioritise relationship identification (effect size and direction) over the precision of hypothesis testing. In such cases, both Type I and Type II errors are relevant and should be minimised. The estimated equally weighted average of the two errors for each explanatory variable is a function of the significance level (Type I) and appears to be minimised for the FCP indices at significance levels between 0.1 and 0.3 (**Figure 2**), which may seem unconventionally high, but is justified given the small sample size and the exploratory purpose of the study. The choice of the significance level is important for six out of nine FCP indices, while the other three indices have high average errors that are not sensitive to changes in the significance level.*

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Annex A. Joint versus separate estimation of FCP indices with PCSE.

		PCSEjoint	PCSE_FI	PCSE_FL	PCSE_DR	PCSE_CR	PCSE_AF	PCSE_CP	PCSE_FT	PCSE_DS	PCSE_RC
1	GDP	-4.59*** (1.21)	-3.96*** (1.27)	-4.02*** (1.21)	-4.26*** (1.24)	-3.99*** (1.22)	-4.03*** (1.25)	-4.03*** (1.24)	-4.08*** (1.32)	-4.05*** (1.24)	-4.60*** (1.25)
2	CPI	0.31 (0.38)	-0.12 (0.40)	0.35 (0.39)	0.07 (0.39)	-0.07 (0.37)	-0.05 (0.40)	-0.06 (0.39)	-0.03 (0.41)	0.05 (0.38)	-0.03 (0.40)
3	Debt	0.18* (0.16)	0.20* (0.18)	0.22* (0.18)	0.20* (0.18)	0.21* (0.17)	0.20* (0.18)	0.18 (0.18)	0.19 (0.18)	0.13 (0.17)	0.23* (0.17)
4	Unem	0.18** (0.11)	0.25*** (0.12)	0.22*** (0.11)	0.21*** (0.12)	0.28*** (0.12)	0.25*** (0.12)	0.26 *** (0.12)	0.23*** (0.12)	0.24*** (0.11)	0.23*** (0.11)
5	COVID	16.85*** (6.10)	12.29*** (5.82)	12.73*** (5.78)	11.84*** (5.67)	15.10 *** (6.21)	12.16*** (5.88)	12.00*** (5.70)	11.76*** (6.15)	10.23*** (5.48)	14.64*** (5.83)
6	EU	-12.70*** (6.42)	-10.55*** (6.34)	-13.73*** (6.48)	-12.55*** (6.41)	-11.42*** (6.10)	-11.63*** (6.27)	-11.32*** (6.28)	-11.41*** (6.58)	-11.85*** (6.31)	-11.12*** (6.35)
7	ROL	6.41** (3.91)	4.48* (3.94)	6.84*** (3.93)	5.81** (3.90)	5.99** (3.82)	5.62** (3.91)	5.46** (3.84)	5.00* (4.13)	6.72*** (3.80)	5.29** (3.89)
8	SLR	-0.25*** (0.11)	-0.17*** (0.10)	-0.17*** (0.10)	-0.15** (0.10)	-0.16*** (0.10)	-0.16*** (0.10)	-0.16*** (0.09)	-0.15** (0.10)	-0.14** (0.10)	-0.22*** (0.10)
9	ENF	-0.48*** (0.22)	-0.28* (0.25)	-0.35** (0.23)	-0.30* (0.25)	-0.32* (0.25)	-0.30* (0.25)	-0.34** (0.26)	-0.28* (0.25)	-0.43*** (0.22)	-0.33** (0.24)
10	DCI	0.38*** (0.12)	0.34*** (0.11)	0.41*** (0.12)	0.34*** (0.12)	0.38*** (0.11)	0.34*** (0.11)	0.34*** (0.11)	0.32*** (0.12)	0.28*** (0.10)	0.36*** (0.12)
11	INS	-0.41*** (0.16)	-0.33*** (0.15)	-0.28*** (0.15)	-0.30*** (0.15)	-0.40*** (0.15)	-0.35*** (0.15)	-0.38*** (0.15)	-0.34*** (0.15)	-0.40*** (0.15)	-0.32*** (0.15)
12	FI	19.67*** (10.54)	5.08 (8.57)								
13	FL	-19.48*** (11.11)		-17.93*** (9.63)							
14	DR	1.14 (9.40)			-5.49 (9.45)						
15	CR	-16.70*** (7.07)				-13.45*** (7.03)					
16	AF	3.78 (8.93)					-2.67 (7.70)				
17	CP	9.16** (6.13)						5.71 (6.05)			
18	FT	3.43 (10.17)							-0.75 (10.07)		
19	DS	10.28 (10.09)								5.71 (9.18)	
20	RC	-37.08*** (11.53)									-21.05*** (9.80)
21	_cons	49.04 (22.10)	18.50 (23.70)	24.50 (21.69)	23.93 (22.93)	30.94 (21.83)	25.16 (22.82)	23.81 (22.64)	23.51 (24.28)	35.04 (20.57)	40.06 (22.88)
22	N	175	190	187	190	195	194	195	190	194	192
23	R-sq	0.343	0.254	0.279	0.246	0.265	0.25	0.255	0.237	0.265	0.273

Comment: The two research papers (Kriese, Abor, & Agbloyor, 2019), (Pasiouras, 2018) that examined the relevance of FCP dimensions relied on specifications in which each index was assessed separately. We consider such an approach as deficient, as it ignores potential collinearity among the dimensions and may substantially distort the estimated relationships. Moreover, both studies found relevance for more than one dimension in the separate specifications, which itself may indicate that the separate specifications suffer from omitted-variable bias since relevant FCP dimensions are excluded. This constitutes a major violation of the underlying regression assumptions likely causing biased results and possibility for misleading interpretations. To illustrate possible differences in estimation results, we repeat the panel time-cross-sectional model with PCSE for joint and separate specifications. This experiment shows that two out of five FCP indices lose statistical significance, financial inclusion and credit pricing, and overall, the models lose significant explanatory power (much lower R2).

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