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CONTENTS

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Financial inclusion, market concentration and underwriting performance: Empirical evidence from Central Eastern and Southeastern European countries

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Abstract

Synergies or trade-offs may arise between financial inclusion and financial stability, depending on the type of financial market and the level of market competition. We focus on the less inclusive and less competitive Central Eastern and Southeastern European non-life insurance markets and examine the link between financial inclusion and insurers' underwriting performance and whether the insurance market concentration affects the inclusion-performance nexus. We use two measures of financial inclusion in insurance, one measuring the availability of insurers and the other measuring the aggregate insurance premium volumes. The results suggest that the impact of inclusion on underwriting performance is conditional on how inclusion is measured and

Keywords

- insurance
- financial inclusion
- market concentration
- underwriting performance

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on the prevailing market structure. These findings highlight the need for further research but also suggest that policy efforts aimed at fostering more inclusive insurance markets should consider the structural characteristics of insurance markets to ensure effective outcomes for consumers, insurers, and regulators.

JEL codes: G22, I31, L10, O52

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Introduction

Financial inclusion has become a high-priority commitment for governments around the world and has been identified as an important means to achieving Sustainable Development Goals (SDGs), especially poverty alleviation (World Bank, 2018). Greater access to and use of financial services, such as savings, bank credit, insurance and payments, help reduce poverty and income inequality (Jungo et al., 2022c). While financial inclusion has a positive influence on important economic outcomes, it may have destabilising effects on financial systems. As access to financial services increases for less sophisticated consumers and businesses, financial institutions face higher costs in reaching these consumers and businesses, which may result in increased vulnerabilities in the interconnected financial system (Čihák et al., 2021; Feghali et al., 2021).[5] The current literature focuses primarily on the banking sector and examines the link between financial inclusion and financial stability, thereby neglecting the potential influence on the insurance sector (e.g., Chinoda & Kapingura, 2023; Feghali et al., 2021; Jungo et al., 2022b).

The demand for (micro) insurance in low-income countries remains low despite the expectation of higher take-up rates driven by the exposure to frequent adverse events in those environments where risk transfer options are limited (Platteau et al., 2017). Current evidence shows that financial exclusion and liquidity constraints hinder demand for insurance (Luciano et al., 2016; Platteau et al., 2017). Additionally, some individuals and businesses may be excluded because of supply-side factors. Due to the potentially higher costs (adverse selection and moral hazards) in dealing with riskier consumers and businesses, insurers may opt to limit the supply of insurance services. Such behaviour more likely arises in more concentrated insurance markets,

[5] An alternative view is that financial inclusion provides diversification benefits for financial institutions contributing to greater financial stability (e.g., Čihák et al., 2021; Han & Melecky, 2013; Hanning & Jansen, 2010, Jungo et al., 2022b).

in line with the structure-conduct-performance (SCP) hypothesis (Bajtelsmit & Bouzouita, 1998; Chidambaran et al., 1997; Cole et al., 2015; Pope & Ma, 2008). Thus, more concentrated markets may be associated with lower access and use of insurance services, resulting in a more profitable and stable insurance market. Alternatively, larger insurers in more concentrated markets may be prone to risky behaviour and acquire less sophisticated consumers and businesses, leading to greater vulnerabilities (e.g., Shim, 2017). Hence, the interplay between financial inclusion and market concentration is ambiguous but pivotal to insurers' profitability and stability.

The aims of this paper are, firstly, to examine the link between financial inclusion and insurers' underwriting performance and, secondly, to establish whether insurance market concentration affects the relationship between financial inclusion and the underwriting performance of insurance markets. We use country-level data and focus on a sample of Central Eastern and Southeastern European countries(CESEE). Over the past three decades, the insurance markets in these countries have undergone significant transformations, including privatisation, deregulation, and liberalisation. These changes aimed to align the CESEE insurance sector with European Union (EU) standards, particularly for countries that have joined or aspire to join the EU (Njegomir & Stojić, 2012). Regulatory adjustments were made to comply with EU frameworks, such as Solvency I and Solvency II, fostering integration and market development (Njegomir & Stojić, 2011). However, despite these efforts, substantial cross-country disparities persist in insurance market development (Born & Bujakowski, 2019). While financial inclusion has improved, concerns remain in several CESEE countries where account ownership rates and insurance penetration lag behind those in more developed European countries (Demirgüç-Kunt & Muller, 2019). A dearth of insurer-level data has hampered the research on Central Eastern and Southeastern European insurance markets. However, XPRIMM's premium and claim database allows for greater region and time coverage (Born & Bujakowski, 2022). We extract data from the International Monetary Fund Financial Access Survey (FAS) to measure the level of financial inclusion, while we construct variables for market concentration and insurers' (underwriting) performance from the XPRIMM's premium and claims database. To test our hypotheses, we employ instrumental variables panel data regression analysis to control potential endogeneity issues.

This paper contributes to at least two domains of research. Firstly, the current literature is mainly concerned with how financial inclusion affects bank stability (e.g., Chinoda & Kapingura, 2023; Feghali et al., 2021; Jungo et al., 2022b) and the mediating effects of bank market competitiveness (e.g., Beck et al., 2004; Jungo et al., 2022a; Owen & Pereira, 2018; Rosengard & Prasetyantoko, 2011). However, the greater access to and use of financial services may stimulate demand for insurance from less sophisticated consum-

ers and businesses, which has implications for the stability and profitability of insurers. Secondly, the interplay between financial inclusion and market concentration may have diverse impacts on insurers' stability and profitability. The extant literature focuses on the direct relationship between market concentration and insurers' stability and performance without considering potential mediating variables (e.g., Bajtelsmit & Bouzouita, 1998; Chidambaran et al., 1997; Cole et al., 2015; Pope & Ma, 2008; Shim, 2017). However, the increase in those having access to financial services affects insurers' decisions on whether to compete and absorb the increase in demand, resulting in a riskier portfolio or restricting the supply of insurance services, securing monopoly profits in the absence of strong competition.

Finally, the study provides policy implications relevant for the insurance regulators and policymakers in the Central Eastern and Southeastern European countries. Initially, if a trade-off emerges between financial inclusion and stability, then policies geared at stimulating higher financial inclusion should be accompanied by a resilient regulatory approach to prevent vulnerabilities in the insurance sector. Alternatively, the concentrated insurance markets may limit the effectiveness of policies aimed at increasing financial inclusion as insurers utilise their market power to restrict the supply of insurance services. On the other hand, financial inclusion may expand the market and increase the competitiveness of the insurance sector, leading to more efficient and stable insurers. In such a case, the policy efforts for more inclusive financial markets would generate improved outcomes for consumers, insurers, and regulators.

This article proceeds as follows: in the next section, we review the existing literature on the effects of financial inclusion and market competition on financial stability and insurers' performance. This is followed by a development of the hypotheses about the relationship between financial inclusion, market competition and insurers' performance and by a description of the data and methodology used to empirically test our hypotheses, and a section containing our results. The final section provides conclusions.

1. Literature review and hypotheses development

1.1. Market concentration and insurer stability

Insurance literature examines the effects of market concentration on insurer stability and performance. Drawing from the industrial organisation literature, researchers devised two competing views.[6] The competition-fragility view as-

[6] See Shim (2017).

sumes that excessive competition in insurance markets reduces profit margins, prompting riskier behaviour of insurers and deteriorated insurer stability (e.g., Keeley, 1990). This view is also consistent with the structure-conduct-performance hypothesis, which states that insurers in more concentrated markets have the power to restrict supply or raise prices, achieving higher profits and stability. Several studies find support for the competition-fragility hypothesis: Shim (2017) for the US property-liability insurance market, Cummins et al. (2017) for the European life insurance market, and Altuntas and Rauch (2017) for the global property-liability insurance market. Additionally, the literature provides support to the structure-conduct-performance hypothesis for non-life insurance markets (e.g., Bajtelsmit & Bouzouita, 1998; Chidambaran et al., 1997; Cole et al., 2015; Janků & Badura, 2021; Pope & Ma, 2008).

Alternatively, the competition-stability view states that large insurers, expecting a government bailout in case of financial difficulties, hold lower capital buffers and tend to undertake riskier actions (e.g., Kasman et al., 2020), while stronger competition causes price reductions and affordable insurance products, mitigating the adverse selection and moral hazard problems through a more diversified customer base resulting in higher insurer stability. Kasman et al. (2020) provide support for both the competition-stability and competition-fragility hypothesis for Türkiye's non-life insurance market. Additionally, Alhassan and Biekpe (2018) and Janků and Badura (2021) discover a non-linear relationship between market concentration and insurer stability and performance in the South African and European non-life insurance markets, respectively. The evidence of the non-linear relationship between market concentration and insurer stability may indicate mediating effects of potentially omitted variables.

1.2. Financial inclusion and financial stability

The extant literature recognises that the complex relationship between financial access and financial stability depends on sectoral differences as well as market competitiveness, and focuses primarily on the banking sector, in doing so neglecting the relationship between financial inclusion, market competitiveness and stability in the insurance sector. The researchers provide two opposing views regarding the relationship between financial inclusion and financial stability. One strand of the literature claims that financial inclusion provides stabilising benefits for the financial system by instigating deeper and more diversified financial systems, providing greater resilience in normal and crisis periods, and reducing the exposures of financial institutions. For instance, Hanning and Jansen (2010) argue that financial inclusion reshapes financial markets by introducing new lines of business without increasing the systemic

risk due to the idiosyncratic nature of microfinance business lines and proper regulation and supervision related to those lines of business. Additionally, financial inclusion enhances a resilient banking system during crises by mitigating deposit withdrawals (Han & Melecky, 2013) and limiting the declines in credit and borrower growth rates (López & Winkler, 2019). Also, Čihák et al. (2016) find that financial inclusion contributes to financial stability in normal times by decreasing through-the-cycle expected losses and costs of business for banks. Finally, broader access to financial services reduces credit risk and improves bank efficiency. For instance, Jungo et al. (2022b) find that financial inclusion reduces credit risk in sub-Saharan African countries, while Chinoda and Kapingura (2023) find that digital financial inclusion correlates negatively with non-performing loan rates. Lastly, Ahamed & Mallick (2019) argue that financial inclusion improves bank stability by boosting bank operating efficiency. Given the parallels between banking and insurance in terms of risk management, financial intermediation, and market dynamics, insights from the banking sector can offer valuable perspectives on how financial inclusion may influence stability in the insurance industry, particularly regarding risk diversification, market resilience, and operational efficiency.

The other strand of the literature argues that there is a trade-off between financial inclusion and financial stability. This trade-off would probably materialise via increasing the risk-taking behaviour of less sophisticated, low-income individuals, especially concerning greater access to credit, which may instigate unexpected losses for banks. Čihák et al. (2016, 2021) claim that greater access to credit accelerates consumer credit growth, resulting in substantial systemic risk, which may lead to banking crises. However, the authors find that synergies arise between financial inclusion and financial stability concerning greater access to saving and insurance products. By using a large panel of over 100 countries, Feghali et al. (2021) confirm that bank stability is negatively related to greater credit access while positively related to greater savings and payment access.

The recent literature on the inclusion-stability nexus uncovers two important mediating effects of competitiveness in the financial sector. Firstly, financial institutions may exert their market power to expand their customer base and reduce marginal costs (via scale economies), resulting in greater financial stability. Ahamed and Mallick (2019) find positive effects of financial access on bank stability for high-market-power banks.[7] Alternatively, greater market competitiveness may relax the population's access to financial services, inducing financial institutions to take higher risks, resulting in deteriorated financial

[7] Two additional studies, Chinoda and Kapingura (2023) and Jungo et al. (2022b), discuss the potential interaction effects between financial inclusion and bank competitiveness on bank stability, although they do not test this directly by including interaction terms. Both studies find a negative relationship between market competitiveness and bank stability.

stability. In this regard, Feghali et al. (2021) find that the negative effects of credit inclusion on bank stability are enhanced in more competitive markets.

1.3. Hypotheses development

Information asymmetry between insurers and policyholders regarding the insured's risk profile presents a fundamental challenge in designing insurance contracts (e.g., Rothschild & Stiglitz, 1978). Since risk levels are private information, insurers must rely on mechanisms that induce policyholders to self-select into contracts that reflect their true risk profile (e.g., Salop & Salop, 1976). Rothschild and Stiglitz suggest that insurers achieve this by offering differentiated combinations of premiums and deductibles, encouraging the separation of high-risk and low-risk customers. In underdeveloped Central Eastern and Southeastern European insurance markets, self-selection mechanisms may not function effectively due to limited financial literacy, weak enforcement of risk-based pricing, and data constraints that hinder accurate risk assessment. Additionally, high market concentration reduces competitive pressures to develop differentiated contracts, while regulatory restrictions and consumer distrust further limit insurers' ability to incentivise policyholders to reveal their true risk profiles. As a result, insurers may rely on broad pricing strategies or supply restrictions rather than sophisticated self-selection mechanisms, weakening the potential benefits of financial inclusion on underwriting performance.

Greater financial inclusion broadens access to insurance services for less financially sophisticated consumers and small businesses. While this expansion can introduce higher acquisition and underwriting costs, it also allows insurers to diversify their risk pool. If low-risk individuals predominate among newly gained customers, insurers benefit from a broader, more stable risk distribution, enhancing underwriting performance through lower loss ratios.[8] However, if the newly included population is dominated by high-risk individuals, such financial inclusion may fail to improve underwriting performance, due to the greater exposure to adverse selection and moral hazard. Moreover, low-income, high-risk individuals may remain uninsured or underinsured as a result of the limited expected benefits relative to costs, further influencing the overall effect of financial inclusion on insurer profitability.[9]

[8] Ahamed and Mallick (2019) find that banks with larger pool of customers with respect to retail deposits tend to be more stable in the inclusive financial sector by reducing the costs and risks.

[9] Insurance contracts may not provide the expected payout for customers for every potential loss. Thus, insurance demand may be lower, especially for index-based insurances, where the insurance payouts are based on an index (Clarke, 2016).

Market structure plays a critical role in shaping the relationship between financial inclusion and underwriting performance. In highly concentrated markets, insurers may strategically limit coverage for low-income, high-risk consumers, thereby reducing the potential benefits of financial inclusion on underwriting performance. In contrast, more competitive markets encourage price reductions and the development of affordable insurance products, facilitating broader access for low-income consumers. This increased access can mitigate adverse selection and moral hazard by fostering a more diversified customer base, reinforcing the positive effects of financial inclusion on insurers' underwriting performance. In Central Eastern and Southeastern European (CESEE) countries, the structure-conduct-performance (SCP) hypothesis is more likely to hold due to high market concentration, regulatory constraints, and limited competitive pressures. Many insurance markets in the region are dominated by a few large firms, often former state-owned enterprises or subsidiaries of multinational insurers, enabling them to impose supply restrictions and sustain higher prices rather than compete on efficiency. Strict EU regulatory requirements, such as Solvency I and Solvency II, create high compliance costs that act as entry barriers, further limiting competition. Additionally, low consumer mobility, lack of price transparency, and historical legacies of state-controlled monopolies reduce competitive dynamics, allowing dominant insurers to exercise market power. Thus, our analysis is guided by two hypotheses:

H1: A higher level of financial inclusion improves the underwriting performance of non-life insurers through reduced loss ratios.

H2: The positive effect in H1 on underwriting performance is expected to be lower in more concentrated insurance markets, where insurers have the power to impose supply restrictions or raise rates.

2. Data and methodology

2.1. Sample and data

To test our hypotheses, we analyse a sample of Central Eastern and Southeastern European countries, including both European Union (EU) member states and EU candidate countries. Our sample consists of countries from Central and Eastern Europe (CEE) and Southeastern Europe (SEE), encapsulating the Western Balkans, Türkiye, and Georgia as EU candidate countries. Specifically, the CEE subregion includes EU member states such as the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, and Slovenia, which have relatively more developed financial systems and higher levels of finan-

cial inclusion due to their longer EU membership and economic integration. In contrast, the SEE subregion, comprising Bulgaria, Croatia, Cyprus[10], as well as the Western Balkans—Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and Serbia—exhibit greater variation in financial inclusion and market development. Additionally, our sample includes EU candidate countries, such as Georgia, Moldova, Ukraine, and Türkiye, which have distinct economic structures and financial sector developments.

While these countries share a common objective of aligning their financial regulations with EU standards, they exhibit substantial heterogeneity in financial inclusion and insurance market concentration. Financial inclusion levels vary widely across the region; for instance, account ownership rates remain unsatisfactory in many countries (e.g., Demirgüç-Kunt & Muller, 2019), and the proportion of individuals who saved any money in the past year is even lower, indicating that while some have bank accounts, they do not actively use them for savings (Feghali et al., 2021). This disparity suggests that financial infrastructure development and utilisation differ significantly within the region.

In addition, the degree of foreign investor presence and its impact on market concentration is uneven across countries. The strong presence of foreign affiliates in certain markets underscores the region's relevance within the fragmented European insurance industry, yet this influence is not uniform. As presented in Table 1, the average Herfindahl-Hirschman Index (HHI) exceeds 1300, indicating a relatively high market concentration.[11] However, significant variations exist, with some countries having more competitive insurance markets than others. Similarly, insurance density, measured by the inflation-adjusted Gross Written Premium per capita, averages 210.3 US dollars but fluctuates considerably across the sample, reinforcing the heterogeneity in market development. Table 1 provides detailed descriptive statistics on these variations, supporting our argument that while regulatory frameworks align, financial inclusion and market structures remain diverse, making this heterogeneity a crucial aspect of our analysis.

To construct our main dependent variable, loss ratio (LR), we collect non-life premium and claim data from XPRIMM's database for 19 countries over the period 2010–2021. The complete list of countries is included in Table A1 in the Appendix. The loss ratio shows the total technical outflows related to claim settlement activities as a measure of underwriting profitability (Janků & Badura, 2021). We calculate it with country-level data as a ratio of claims paid

[10] We had to exclude Romania from the sample due to missing claim data.

[11] The Herfindahl-Hirschman index is the sum of the squared percentage market share for non-life insurance for each insurer in the country. Market share is defined as the proportion of total non-life premiums accounted for by each insurer in the country based on gross non-life premium written.

We additionally used the percentage share of the top 3 insurers' premiums in total premiums and the Theil index. The regression results remain qualitatively similar.

to gross premiums written. A persistently high loss ratio may indicate that insurance companies are facing financial difficulties (Kwon & Wolfrom, 2017).

Table 1. Descriptive statistics

Variable	Obs.	Mean	Standard deviation	Minimum	Maximum
Loss ratio (LR) (%)	203	49.553	11.875	19.613	93.904
Insurers per 100,000 adults (ICPOP)	203	0.914	0.709	0.1	3.63
Real Gross Written Premium Per Capita (RGWPPC)	203	210.294	212.003	20.055	1014.191
Herfindahl Hirschman Index (HHI)	203	1398.366	545.044	323.375	2974.358
Economic Development (EDEV)	203	9.037	.721	7.661	10.253
Population (POP)	203	15.333	1.151	13.336	18.223
Financial Development (FDEV) (%)	203	57.002	34.991	22.762	254.668
Openness (OPEN) (%)	203	114.881	29.459	48.328	170.76
Inflation (INFL) (%)	203	2.859	4.38	–2.097	48.7
Governance (GOV)	203	15.966	9.666	–2.805	35.125
Agriculture (AGRIVA) (%)	203	5.945	4.312	1.541	19.99
Population density (POPDEN)	203	81.92	30.515	30.24	138.576

Source: own calculations.

We use two measures of financial inclusion, which relate to the insurance aspect of financial inclusion: Firstly, we extract data for the number of insurance corporations per 100,000 adults (variable: ICPOP) from the International Monetary Fund Financial Access Survey (FAS),[12] which is available yearly and relates to the supply side of finance. Secondly, we extract data about Gross Written Premium from the XPRIMM database and inflation and population data from the World Bank database to construct an inflation-adjusted Gross Written Premium per capita, constant 2010 US dollars (variable: RGWPPC). Table A2 in the Appendix contains a detailed description of the variables and the sources.

The selected measures (ICPOP and RGWPPC) gauge financial inclusion in insurance, but they may capture different dimensions. Conceptually, ICPOP is a supply-side indicator—a measure of insurer availability relative to the population—whereas GWP per capita reflects insurance demand, indicating how much the average individual spends on insurance. In other words, a higher ICPOP signifies more insurance providers accessible per adult (greater out-

[12] Researchers tend to devise a financial inclusion index from a wide set of indicators available in the IMF FAS database (e.g., Jungo et al., 2022b).

reach and competition), while a higher GWP per capita denotes greater insurance usage or density (higher premiums written per person, often tied to income levels). These differences may mean the two measures do not always move together. As such, a country can have many insurers relative to its population but still low average premiums (if consumers buy very little insurance) or, conversely, few insurers but high average premiums (if a concentrated market sells relatively expensive policies). Given these differences, ICPOP may emerge as a more appropriate measure of financial inclusion because it directly gauges the breadth of the insurance supply in each country and thus better captures the extent to which consumers have access to insurance services. In contrast, GWP per capita, while useful as an aggregate penetration metric, does not distinguish whether premiums are coming from a broad base of policyholders or just a narrow segment. Thus, we take ICPOP as our main proxy for inclusion, and we use GWP per capita as a robustness check.

Finally, we devised a set of control variables. The inclusion of control variables will capture the independent effects on insurer performance, mitigating the omitted variable bias problem. The set of controls comprises: natural logarithm of real Gross Domestic Product per capita (measure of economic development), natural logarithm of population (measure of demographics and market size), share of domestic credit to private sector as a percentage of Gross Domestic Product (measure of financial development), trade as a percentage of Gross Domestic Product (measure of openness), inflation rate (measure of economic (in)stability), governance (measure of institutional development) measured by the principal component of the six measures in Kaufmann et al. (2011) (see Table A2 in the Appendix for more details on variables construction).[13]

2.2. Methodology

We employ panel data regression analysis to avoid the weaknesses of possible serial correlation, which may arise in the pooled OLS regressions. Fixed-effects and random-effects regressions possess certain weaknesses. While the fixed-effects approach captures only within effects abstracting from the time-invariant variations, the random-effects approach implicitly assumes that the within (longitudinal) and between (cross-sectional) effects are identical (Bell & Jones, 2015). Thus, based on Mundlak (1978), Bell and Jones (2015) developed an approach to separate within and between effects. They suggest a group mean centring in which a variable is transformed by subtracting

[13] We follow Feghali et al. (2021) and include a similar set of control variables. Additionally, we extend the control set with inflation and trade openness as important determinants of non-life insurance development (e.g., Sawadogo et al., 2018).

the average over time from the original variable and including the time-averaged variables in the regression before running a random-effects estimation. Accordingly, we develop the following regression equation to test our hypotheses:

$$\begin{aligned} LR_{it} = \beta_0 + \beta_1(FI_{it} - \overline{FI_i}) + \beta_2\overline{FI_i} + \beta_3(FI_{it}\cdot HHI_{it} - \overline{FI_i}\cdot\overline{HHI_i}) + \\ + \beta_4(FI_i\cdot\overline{HHI_i}) + \beta_5(HHI_{it} - \overline{HHI_i}) + \\ + \beta_6\overline{HHI_i} + f'(X_{it} - \overline{X}_i) + \delta'\,\overline{X}_i + d_t + v_{it} \end{aligned} \quad (1)$$

where LR_{it} is the loss ratio for the country i and year t, FI_{it} is one of the financial inclusion proxies, HHI_{it} is the Herfindahl Hirschman index, X_{it} is a matrix of control variables, d_t is the year dummy, v_{it} is the error term, and the bar notation for each variable serves to designate the time-averaged data. Thus, the β_1, β_3 and β_5 capture the within effect, while β_2, β_4 and β_6 is the between effect for our main variables.

However, random-effects ordinary least squares (OLS) estimation does not resolve endogeneity issues arising from reverse causality and omitted variables. As Morgan and Pontines (2018) argue, that the relationship between financial inclusion and financial stability may mean that more stable financial markets provide greater access to finance for individuals and businesses. Thus, primarily we opt to estimate ordinary least squares regressions and then implement a more robust estimation strategy by employing random effects two-stage least squares regressions using instrumental variables (IV-2SLS) to control for the endogeneity issues.

For a proper identification strategy, we must decide on the treatment of the main independent variables and the selection of a proper instrument list. As stated previously, we treat financial inclusion variables as endogenous; thus, every interaction term with the FI_{it} results in endogenous variables. In that case, the estimation of within-between random-effects with instrumental variables (WBRE-IV) represent systems nonlinear in endogenous variables. Such a system requires a different or extended set of instruments for proper identification. Wooldridge suggests a general approach to dealing with nonlinear systems in endogenous variables through the inclusion of squares and cross-products of the exogenous variables (e.g., Michler et al., 2019).

We select two instruments to control for the endogeneity issues between financial inclusion and insurer performance: population density (population per squared kilometre of land area) (POPDEN) and the percentage share of agriculture, forestry, and fishing value added in GDP (AGRIVA). Higher population density drives greater access to finance through cost reductions caused by economies of scale effects and the elimination of distances (Alter & Yontcheva, 2015; López & Winkler, 2019). Additionally, agriculture emerges as an important determinant of financial inclusion (e.g., Evans, 2018). While

agricultural workers are generally underinsured, improved agricultural productivity increases the affordability and importance of insurance products for agricultural workers via greater output being at risk. We use the following extended set of squared and interaction terms of exogenous variables: the percentage share of agriculture, forestry, and fishing value added in GDP (AGRIVA), the percentage share of agriculture, forestry, and fishing value added in GDP squared ($AGRIVA^2$), the product of the percentage share of agriculture, forestry, and fishing value added in GDP and the Herfindahl Hirschman Index (AGRIVA*HHI), the population density (POPDEN), the population density squared ($POPDEN^2$), and the product of the population density and the Herfindahl Hirschman Index (POPDEN*HHI). To check for the consistency of the regressions, we use an overidentifying restrictions test (Hansen J-statistic).[14]

Finally, we decided to treat the Herfindahl-Hirschman Index as an exogenous variable for the following reasons: Firstly, the primary aim of this analysis is not to examine the concentration-performance relationship in the insurance industry but to provide evidence of how the relationship between financial inclusion and insurer performance differs depending on the extent of market concentration. Secondly, the treatment of the Herfindahl-Hirschman Index as an endogenous variable would complicate the analysis and interpretation of the results due to the need to include a new set of instruments. Lastly, the structure-conduct-performance hypothesis presumes that market structure is exogenously given in determining market performance (e.g., Cole et al., 2015).

3. Empirical results

We start our analysis by running within-between random-effects (WBRE) models without (OLS) and with (IV) instrumental variables, using the number of insurance corporations per 100,000 adults as a proxy for financial inclusion (Equation 1). Table 2 presents the estimates of the within effect (corresponding to the transformed variables DeavgICPOP, DeavgICPOP*HHI, and DeavgHHI) and between effect (corresponding to the time-averaged variables AvgICPOP, AvgICPOP*HHI, and AvgHHI). The coefficient of the group-mean-centred number of insurance corporations per 100,000 adults (DeavgICPOP) is insignificant, regardless of the chosen specification. Given that the variation in this variable is sluggish over time, it is less likely to capture any time effects of financial inclusion on insurer performance. On the other hand, the time-av-

[14] The null hypothesis is that the instruments are valid instruments, i.e. uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation.

eraged number of insurance corporations per 100,000 adults (AvgICPOP) is negative, but only significant at a 5 percent level in the regressions with interaction terms. Also, the results of the between-effect are robust in the IV regressions. The interaction term, the time-averaged product of the number of insurance corporations per 100,000 adults and the Herfindahl Hirschman Index (AvgICPOP*HHI) is positive and statistically significant at a 5 percent level. The insignificance of the coefficient of financial inclusion in the regressions without interaction terms suggests that the relationship between financial inclusion and insurer performance is complex and non-linear.

We fail to find support for the first hypothesis of a linear relationship existing between financial inclusion and underwriting performance. Rather, the results suggest that greater financial inclusion improves the performance of non-life insurers through lower loss ratios, although the relationship depends on the level of market competitiveness. The positive coefficient of the interaction term indicates that the positive effects of financial inclusion on insurer performance are stronger in the markets with lower levels of market concentration (higher competitiveness). Additionally, the between effect of HHI is consistently negative and significant at a 5 and 10 percent level (see Table 2), supporting the structure-conduct-performance hypothesis conditional on the level of financial inclusion.[15]

The Wald Chi-squared statistic shows that the within-between random-effects regressions are estimated correctly. The results of the Hansen test show that the instruments are exogenous. The test statistics are insignificant, showing that instruments are not correlated with the error term. In summary, the diagnostic tests suggest that the instruments and models are correctly specified.

Additionally, we estimate Equation 1, with the real Gross Written Premium (GWP) per capita as a measure of financial inclusion, using the within-between random effects panel data method without and with instrumental variables. Table 3 reports the results of the ordinary least squares (WBRE OLS) and two-stage least squares with instrumental variables (WBRE IV) regressions. Similarly, we fail to find significant within effects, as the coefficient of the group-mean-centred real GWP per capita (DeavgRGWPPC) is negative but insignificant. Considering the between effects, we observe surprising results as the coefficient of the time-averaged real GWP per capita (AvgRGWPPC) is positive and statistically significant at a 1 percent confidence level. However, after the inclusion of the interaction term, the coefficients become insignificant. These apparently contradictory results may suggest that the real GWP

[15] Additionally, we performed separate analyses for the EU and non-EU groups. Although the results lost statistical significance, the coefficients for the between effects maintained their direction. Despite the lack of significance, the findings suggest that the variation in the non-EU group primarily drives the between effects.

Table 2. Relationship between financial inclusion, market concentration and loss ratio (ICPOP variable)

Method	WBRE (OLS)	WBRE (OLS)	WBRE (IV)	WBRE (IV)
Dependent variable	**Loss ratio**	**Loss ratio**	**Loss ratio**	**Loss ratio**
DeavgICPOP	–2.027	–3.145	7.366	–21.323
	(–0.219)	(–0.333)	(0.155)	(–0.929)
DeavgICPOP*HHI		0.001		–0.002
		(0.210)		(–0.153)
DeavgHHI	–0.002	–0.004	–0.002	–0.002
	(–0.751)	(–0.699)	(–0.566)	(–0.214)
AvgICPOP	–6.347	–29.080**	–5.060	–28.937**
	(–0.838)	(–2.181)	(–0.693)	(–2.156)
AvgICPOP*HHI		0.009**		0.009**
		(2.086)		(2.068)
AvgHHI	–0.002	–0.011**	–0.002	–0.011*
	(–0.492)	(–2.000)	(–0.613)	(–1.958)
Constant	81.12	122.88**	71.79	121.86**
	(1.201)	(2.325)	(1.097)	(2.331)
Observations	203	203	203	203
# of Countries	19	19	19	19
Time dummies	**Included**	**Included**	**Included**	**Included**
Wald Chi-squared	246.2	284.34	343.3	2397
R-squared (between)	0.719	0.771	0.722	0.765
Hansen *J*-statistics (*p*-value)			0.3212	0.7084

Note: All models are estimated using the Within-Between Random-Effects (WBRE) panel data method using the xtreg/xtivreg command in STATA. The financial inclusion variable, the number of insurance corporations per 100,000 adults (ICPOP) and the interaction term between the number of insurance corporations per 100,000 adults and Herfindahl Hirschman index (ICPOP*HHI) are treated as endogenous in the IV models. The instruments are the percentage share of agriculture, forestry, and fishing value added in GDP (AGRIVA), the percentage share of agriculture, forestry, and fishing value added in GDP squared ($AGRIVA^2$), the product of the percentage share of agriculture, forestry, and fishing value added in GDP and the Herfindahl Hirschman Index (AGRIVA*HHI), the population density (POPDEN), the population density squared ($POPDEN^2$), and the product of the population density and the Herfindahl Hirschman Index (POPDEN*HHI). The prefix *Deavg* designates the group-mean-centred variables (within effects), and the prefix *Avg* designates the time-averaged variables (between effects). The within and between effects of the control variables are estimated but not displayed in this table for matters of convenience. Robust z-statistics in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: own calculations.

Table 3. Relationship between financial inclusion, market concentration and loss ratio (RGWPPC variable)

Method	WBRE (OLS)	WBRE (OLS)	WBRE (IV)	WBRE (IV)
Dependent variable	**Loss ratio**	**Loss ratio**	**Loss ratio**	**Loss ratio**
DeavgRGWPPC	–0.022	–0.020	–0.052	–0.049
	(–1.436)	(–0.666)	(–0.982)	(–1.134)
DeavgRGWPPC*HHI		–0.001		0.001
		(–0.129)		(1.038)
DeavgHHI	–0.002	–0.002	–0.003	–0.007
	(–0.670)	(–0.348)	(–0.833)	(–1.593)
AvgRGWPPC	0.017***	0.001	0.014***	–0.008
	(3.083)	(0.001)	(2.638)	(–0.127)
AvgRGWPPC*HHI		0.001		0.001
		(0.255)		(0.364)
AvgHHI	–0.004	–0.005	–0.005	–0.006
	(–1.212)	(–0.961)	(–1.498)	(–1.194)
Constant	99.918	95.764	81.936	80.148
	(1.533)	(1.444)	(1.311)	(1.323)
Observations	203	203	203	203
# of Countries	19	19	19	19
Time dummies	**Included**	**Included**	**Included**	**Included**
Wald Chi-squared	275.76	273.39	1535	126.2
R-squared (between)	0.738	0.741	0.739	0.746
Hansen *J*-statistics (*p*-value)			0.82	0.6334

Note: All models are estimated using the Within-Between Random-Effects (WBRE) panel data method using the xtreg/xtivreg command in STATA. The financial inclusion variable, the real GWP per capita (RGWPPC) and the interaction term between the real GWP per capita and Herfindahl Hirschman index (RGWPPC*HHI) are treated as endogenous in the IV models. The instruments are the percentage share of agriculture, forestry, and fishing value added in GDP (AGRIVA), the percentage share of agriculture, forestry, and fishing value added in GDP squared ($AGRIVA^2$), the product of the percentage share of agriculture, forestry, and fishing value added in GDP and the Herfindahl Hirschman Index (AGRIVA*HHI), the population density (POPDEN), the population density squared ($POPDEN^2$), and the product of the population density and the Herfindahl Hirschman Index (POPDEN*HHI). The prefix *Deavg* designates the group-mean-centred variables (within effects), and the prefix *Avg* designates the time-averaged variables (between effects). The within and between effects of the control variables are estimated but not displayed in this table for matters of convenience. Robust z-statistics in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: own calculations.

per capita is relevant for underwriting performance only for very specific levels of market concentration (cf. Brambor et al., 2006).

Figure 1 presents the marginal (between) effect of financial inclusion on underwriting performance for different levels of market concentration. In Panel A, the marginal effect of insurers per 100,000 adults (AvgICPOP) on loss ratios is negative at lower levels of market concentration, but it gradually approaches zero as market concentration rises. This suggests that in more competitive markets, an increase in financial inclusion improves underwriting performance, while in more concentrated markets, the effect cannot be statistically confirmed. In Panel B, the marginal effect of real GWP per capita exhibits a different pattern. At lower levels of market concentration, the effect is negative but insignificant. However, as market concentration rises, the coefficient becomes positive and statistically significant. It explains the apparently contradictory results presented in Table 3 and also suggests that in highly concentrated markets, the expansion of financial inclusion through increased insurance penetration does not necessarily translate into improved underwriting performance.

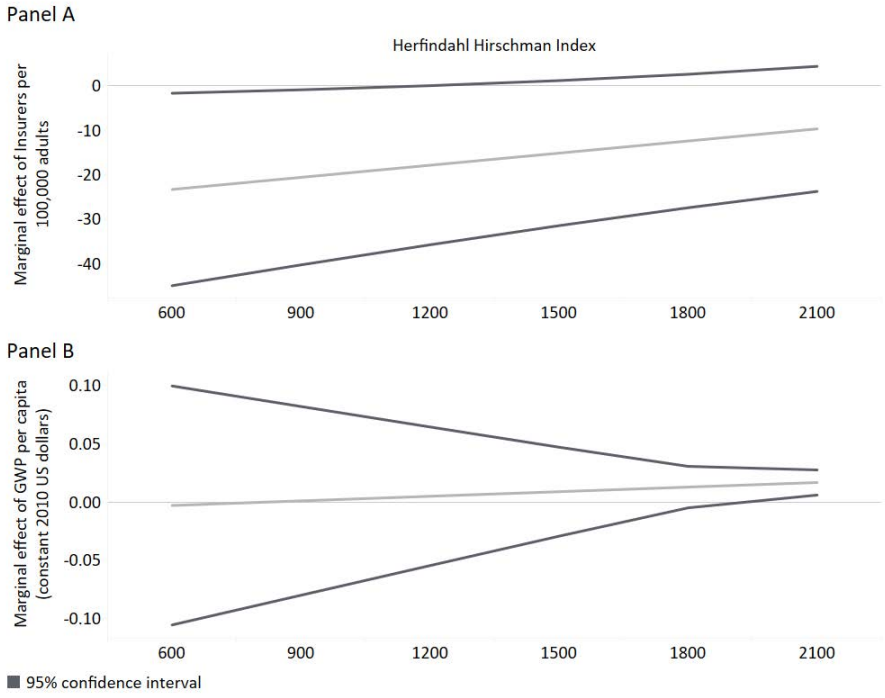

Figure 1. The marginal effect of the number of insurance corporations per 100,000 adults (Panel A) and real GWP per capita (Panel B) on underwriting performance

Source: own calculations based on the parameter (WBRE IV) estimates presented in Tables 2 and 3.

The two measures of financial inclusion applied—ICPOP and real GWP per capita—lead to different conclusions regarding their impact on underwriting performance, particularly in highly concentrated markets. While ICPOP exhibits a significant negative relationship with loss ratios in less-concentrated markets, the results for GWP per capita do not consistently support this relationship. Consequently, neither H1 nor H2 is fully supported, as the findings indicate a complex, nonlinear relationship between financial inclusion, market concentration, and underwriting performance.

These mixed results only partially corroborate the evidence provided by Čihák et al. (2016, 2021) and Feghali et al. (2021) that synergies exist between financial inclusion and financial stability, particularly regarding access to non-credit products. While financial inclusion may expand insurers' customer base and improve risk diversification, thereby lowering loss ratios, the role of market structure appears crucial. This may align with Ahamed and Mallick (2019), who find that financial inclusion enhances bank stability through improved operating efficiency, and Hanning and Jansen's (2010), who argue that financial inclusion does not necessarily amplify systemic risk due to the idiosyncratic nature of income-constrained consumers. However, given the inconsistencies between ICPOP and GWP per capita, further research with more granular data is required to clarify these relationships.

Conclusions

The multidimensional nature of financial inclusion implies that greater access to different financial services may have varied effects on financial markets. The impact of financial inclusion on insurance markets emerges as an important issue, given the growing systemic relevance of insurers (e.g., Jourde, 2022). In this study, we examine the relationship between financial inclusion and insurers' underwriting performance by focusing on the less inclusive and less competitive Central Eastern and Southeastern European non-life insurance markets. Additionally, we analyse the mediating role of insurance market competition on the inclusion-performance link. The results show that the first hypothesis, which assumes a linear relationship between financial inclusion and underwriting performance, does not hold. We find weak evidence that financial inclusion, measured by the number of insurance corporations per 100,000 adults, enhances underwriting performance by lowering loss ratios, particularly in less concentrated insurance markets. While the first measure of financial inclusion exhibits a significant negative relationship with loss ratios in less concentrated markets, the other measure, real GWP per capita, fails to demonstrate a similarly robust association, as its significance disap-

pears when including interaction terms. This inconsistency suggests that the impact of financial inclusion on underwriting performance is conditional on how financial inclusion is measured and that different dimensions of inclusion may interact differently with market concentration.

Given the mixed findings, policy recommendations must be approached with caution. While increasing financial inclusion can lead to more stable and efficient insurance markets, its effectiveness depends on market structure. In Central Eastern and Southeastern European countries, policymakers should carefully evaluate both demand-side and supply-side barriers to insurance inclusion. Enhancing financial literacy and awareness remains important, as low levels of understanding about insurance mechanisms hinder inclusion. However, the effectiveness of state-supported financial education programs may be limited by persistent informal risk-sharing mechanisms and historical reliance on state intervention. Regulators and insurers should also consider targeted interventions to improve underwriting efficiency and business expansion opportunities for vulnerable groups. However, given that GWP per capita does not consistently support the inclusion–performance relationship, broad-based policies to increase premium volumes may not necessarily lead to improved underwriting outcomes. Instead, policies should focus on facilitating competitive insurance markets, reducing excessive concentration, and encouraging new entrants.

Ultimately, while the study provides preliminary insights into the role of financial inclusion in underwriting performance, its limitations must be acknowledged. The assumption that insurers can easily distinguish between high-risk and low-risk individuals may not hold, especially in underdeveloped markets, thus, the diversification effect of a greater customer base on profitability may not materialise if effective mechanisms for dealing with adverse selection are not implemented. Additionally, the company-level data was limited to premium and claim data, allowing us to calculate only a limited set of market concentration and performance variables and to conduct regression analysis with country-level data on a limited sample. Additionally, the nonlinear effects observed in our findings highlight the need for more detailed investigations into how specific types of insurance policies and market conditions interact with financial inclusion. Future research should explore firm-level data and alternative financial inclusion metrics to better understand these dynamics and provide more definitive policy guidance. Finally, a similar analysis can be conducted by taking a sample of Africa, where financial exclusion is more severe.

Appendix

Table A1. List of analysed countries

Albania	Georgia	Poland
Bosnia and Herzegovina	Hungary	Serbia
Bulgaria	Latvia	Slovenia
Croatia	Lithuania	Türkiye
Cyprus	Moldova	Ukraine
Czech Republic	Montenegro	
Estonia	North Macedonia	

Source: own elaboration.

Table A2. Description of variables and sources

Variable	Abbrev-iations	Description	Source
Dependent variable			
Loss ratio	LR	The loss ratio is the ratio of insurance claims paid to gross written premiums calculated on a country level (%)	XPRIMM Data
Main independent variables			
Financial inclusion			
Insurers per 100,000 adults	ICPOP	Number of insurance corporations per 100,000 adults	IMF Financial Access Survey (2010–2021)
Real Gross Written Premium Per Capita	RGWPPC	Gross Written Premium (GWP) per capita (in constant 2010 US dollars)	XPRIMM and World Bank Data (2010–2021)
Market concentration			
Herfindahl Hirschman Index	HHI	Sum of the squared shares of each insurance company's gross premiums written in total non-life gross premiums written in the domestic market	Based on XPRIMM Data
Controls			
Economic Development	EDEV	Natural logarithm of real GDP per capita (constant 2015 US$)	World Bank Data
Population	POP	Natural logarithm of total population	World Bank Data

Variable	Abbrev-iations	Description	Source
Financial Development	FDEV	Domestic credit to private sector (% of GDP)	World Bank Data
Openness	OPEN	Trade (% of GDP)	World Bank Data
Inflation	INFL	Consumer price index (annual %)	World Bank Data
Governance	GOV	Governance indicators are compiled by Kaufmann et al. (2011) and measure each of: 1) regulatory quality, 2) rule of law, 3) government effectiveness, 4) political stability and absence of violence/terrorism, 5) control of corruption, and 6) voice and accountability. Since these variables are highly correlated, we take the first principal component of the 6 indicators as a summary measure.	World Bank Worldwide Governance Indicators
Instrumental variables			
Agriculture	AGRIVA	Agriculture, forestry, and fishing, value added (% of GDP)	World Bank Data
Population density	POPDEN	Population per squared kilometre of land area	Based on World Bank Data

Source: own elaboration.

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