ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

Volume 32(6), 2023

Petar Peshev[1]
Kristina Stefanova[2]
Ivanina Mancheva[3]

WEALTH INEQUALITY DETERMINANTS IN THE EU MEMBERS FROM THE CEE REGION, 1995-2021[4]

This paper models wealth concentration in 11 EU members from the CEE region using official data for the period between 1995 and 2021 and applies panel econometric methods. The analysis uses the world inequality database (WID.world) for deriving wealth distribution and inequality measures. Our results suggest that inequality and wealth concentration grow at the expense of the middle class and the poorer half of the population. Regression results suggest that the main contributors to wealth inequality are the Great Recession of 2008–2009, inflation, house prices, and bond prices, while GDP per capita, equity prices and various interest rates restore a more equal net wealth distribution. Other variables are also found to have direct or indirect (instrumental variables) associations with the wealth concentration (the dependent variables).
Keywords: wealth inequality; wealth determinants; GINI; CEE; panel regression
JEL: D31; E01; G51; D63

1. Introduction

Inequality studies are gaining popularity among economists around the world because of increasing evidence of its rise and its significant social and economic importance. However, the specific mechanisms of wealth inequality are understudied compared to income inequality or the results are mixed.

The relationship between income inequality and wealth inequality is twofold. On the one hand, higher incomes enable the accumulation of wealth, and on the other hand, the accumulated wealth – depending mainly on growth and saving rates and conditions in

[1] *Petar Peshev, Chief(senior)assistant professor, PhD, University of National and World Economy, e-mail: p.peshev@unwe.bg.*
[2] *Kristina Stefanova, Chief(senior) assistant professor, PhD, University of National and World Economy, e-mail: k.petrova@unwe.bg.*
[3] *Ivanina Mancheva, Phd, University of National and World Economy, e-mail: i.c.mancheva@unwe.bg.*
[4] This scientific publication contains results of a study financed with funds from a targeted subsidy for Scientific research activity of UNWE under contract "№ НИД НИ-16/2020".
This paper should be cited as: *Peshev, P., Stefanova, K., Mancheva, I. (2023). Wealth Inequality Determinants in the EU Members from the CEE Region, 1995-2021. – Economic Studies (Ikonomicheski Izsledvania), 32(6), pp. 19-40.*

financial and real estate markets – translates into higher incomes. Not only economic, but also social, institutional, and cultural factors influence this dynamic.

In this paper, we empirically examine the relationships between variables such as asset prices, interest rates and GDP on the one hand, and wealth inequality in the CEE region on the other.

Research on wealth inequality has been hampered by data limitations, particularly in CEE countries, as well as by tax optimization behaviours of corporations. Only a small fraction of corporate shares in the region are publicly traded, and national property registries do not allow conclusions to be drawn about the wealth held by individuals. Eurostat does not provide data on the distribution of wealth in Europe, therefore, survey data, administrative data or estimated (adjusted data) are used. Globally, the most widely used surveys are the US Survey of Consumer Finances (SCF) and the Eurosystem's Household Finance and Consumption Survey (HFCS). However, three CEE countries (incl. Bulgaria) do not participate in the Household Finance and Consumption Survey (HFCS: HFCN, 2020). Indirect estimates of the size and distribution of wealth have to be used instead. Because of the limitations described above, our paper is based on data from the World Inequality Database, and applies the methodology of Alvaredo et al. (2020), which relies mainly on capitalization of incomes, imputations of assets and Liabilities and regression results to draw conclusions about wealth distribution.

The study covers 11 post-socialist CEE countries: Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovakia, and Slovenia. These countries are characterized by very high levels of income inequality but relatively moderate wealth inequality. At the same time, they share common features such as a relatively short history of wealth accumulation, a high homeownership rate and relatively high net savings at the beginning of the transition, and a strong impact of severe episodes of financial instability afterwards[5]. It can be assumed that despite relatively high-income inequality, wealth inequality is lower compared to other EU countries, because of the shorter period of wealth accumulation. The effect of privatization which contributes to a faster rise of private wealth is somewhat mitigated by the high homeownership rate. Since these countries have similar traditions, institutions, and cultural values, the study focuses on the economic determinants of wealth inequality.

The aim of the study is to identify factors of wealth inequality, incl. factors of dispersion of the top decile and percentile, wealth of the middle class and wealth of the poor. The aim of the study is augmented by providing political implications. The study contributes to the growing literature on wealth inequality in two ways: First, it empirically evaluates the impact of selected determinants of wealth inequality in CEE countries which is an understudied problem. Second, this paper highlights some specific features and thus contributes to a better understanding of the interplay between income and wealth inequality.

[5] Bulgaria (1995-1997), Croatia (1995-996), Estonia (1992-1995), Latvia (1994-1999), Lithuania (1995-1996), Hungary (1991-1995), Czech Republic (1991-1995), Poland (1991), Romania (1990), Slovakia (1991), Slovenia (1993-94). *Source*: Reinhart and Rogoff (2013), based on Caprio and Klingebiel (2003).

Our study tests the following hypotheses: The growth and the convergence of GDP in PPS to the EU averages are expected to increase inequality; The 2009 crisis is expected to stimulate inequality; House prices and middle-class wealth is expected to be in a positive association since this is the largest asset component for the middle class; We expect stock prices and bond prices to increase wealth inequality and concentration; Higher interest rates on households' loans and deposits are expected to decrease wealth concentration by lowering prices of financial and real assets and increasing the cost of servicing debts. Lower government bond yields and higher bond prices are supposed to increase inequality. The consumer price change is expected to increase wealth concentration by transferring wealth from creditor to debtor and increasing financial and real assets' prices. Population growth is supposed to increase wealth concentration by allowing fewer individuals to take advantage of the growing population.

Data availability, unbalanced panels, insufficient sample size, missing of reliable information about the wealth distribution and the lack of sufficient previous research on the topic pose limitations to our research. The econometric methods we use reveal an association between dependent and independent variables and hint for possible causation.

The rest of the paper is organised as follows. Section 2 reviews the literature on the determinants of wealth inequality. Section 3 compiles data sources, describes their specifics and the chosen research methods and provides an analytical framework. Section 4 presents the results, and the last section concludes.

2. Overview of the Literature on the Determinants of Wealth Inequality

The study of the causes and factors of the unequal distribution of wealth is gaining popularity among economists worldwide due to the actuality of the issue. However, the roots of wealth inequality in emerging economies, including CEE countries, remain unclear due to a lack of sufficient data.

Scholars use a variety of data sources and methods to track wealth or try to infer the stock of wealth from income data. The methods of wealth estimation suffer from specific weaknesses which may be more pronounced in some CEE countries. In general, while surveys underestimate high income and wealth and the impact of fluctuations in asset market prices, national accounts data contain inaccuracies in mixed income and housing income, and the capitalization method (based on fiscal data) does not capture non-taxable income (For criticism of the different approaches see Garbinti, et al., 2021; Bricker, et al., 2016).

As for **CEE**, wealth inequality is relatively understudied. Brzezinski, et al. (2019) offer an interesting attempt to estimate inequality in the region with an adjustment for the underestimation of the upper tail of the wealth distribution in household surveys. Similar methods for addressing the problem of differential non-response in surveys were originally proposed by Vermeulen (2014) and other authors. Brzezinski, et al. (2019) apply a top-correction procedure using pooled data sets with imputed observations on missing rich individuals from the rich lists. After the adjustment, wealth inequality in countries covered (Estonia, Hungary, Latvia, Poland and Slovakia) reaches levels observed in Western Europe.

The Gini coefficient is corrected by 5.4 points on average. Other authors (e.g. Leitner and Holzner (2008), Peshev (2015), Peshev et al. (2019), Brzezinski and Sałach (2021)), consider different determinants of wealth inequality in CEE.

Globally, existing empirical research focuses on various determinants of wealth inequality and examines their influence. As a starting point, **income inequality** itself is a major driver of wealth concentration, but the relationship is not linear and involves other variables. Chancel et al. (2022) find a strong relationship between income inequality levels and wealth inequality levels, which allows for an estimation of wealth inequality through income capitalization. Piketty and Zucman (2014) find that **wealth-income ratios** in rich countries demonstrate a U-shaped pattern, suggesting that wealth inequality is driven by other factors such as economic growth, the saving rate, and rising asset prices (the snowballing effect). More specifically, they find that the wealth-income ratio has risen from about 200-300% in 1970 to a range of 400–600% in spite of slow economic growth. As an example of the inverse dependence, Milanovic (2019) and Berman and Milanovic (2020) find that so-called homoploutia (the overlapping of high capital-income earners and high labour-income earners) has been sharply increasing since 1985 and accounts for about 20% of the increase in total income inequality in the United States.

Further, different authors focus on individual determinants and seek to explain wealth inequality using a broader set of variables. Certain differences in the methodology used and the results of the studies conducted in different countries and with different objectives are observed, but nonetheless, some important factors contributing to wealth inequalities can be outlined in the literature review.

An important group of factors whose influence on inequality is studied in the literature are **inflation**, **interest rates and monetary policy**. **Inflation** is identified and demonstrated as an important factor in a number of studies in this field (Peshev, et al. (2019), Roine and Waldenström (2015), Berisha and Meszaros (2020), Colciago et al. (2019), Stewart (1939), etc.). The majority of research proves that **inflation leads to an increase** in wealth inequality (e.g., Peshev et al. (2019), Roine and Waldenström (2015), Colciago et al. (2019), Stewart (1939), etc.). In particular, Peshev et al. (2019) examine the influence of a very wide **range of factors** on the inequality in the distribution of deposits in Bulgaria as a measure of gross financial wealth, over the 2005:Q4-2017:Q4 period. The results of the study show that wealth concentration, as measured by the share of the richest decile and the Gini coefficient, is stimulated and positively influenced by inflation and also by **financial deepening, stock prices and interest rates**. Similarly, Roine and Waldenström (2015) conduct a descriptive and econometric analysis of inequality in the distribution of income and wealth in selected developed countries in Western Europe and the United States. Applying an econometric panel study of inequality in income distribution, Roine and Waldenström (2015) define **inflation and financial intermediation** as factors that positively affect income inequality as measured by the income of the top 1%. According to Roine and Waldenström (2015), the conclusions drawn about the factor determination of income inequality can easily be transferred to inequality in wealth distribution. Colciago et al. (2019) examine the relationship between **monetary policy** and inequality (income and wealth) in the context of dual causality: from macroeconomic variables to inequality and vice versa (from inequality to macroeconomic variables through monetary policy transmission channels). The study

concludes that the importance of conventional monetary policy for inequality is unclear, while inflation (at least above a certain level) is a factor for inequality. Stewart (1939) also assumes that inflation and artificially low long-term interest rates contribute to wealth concentration. Opposing this view, Berisha and Meszaros (2020) find that an increase in inflation and interest rates helps decrease wealth inequality. The study uses macroeconomic variables to examine wealth inequality in the USA over the periods 1929-2009 and 1962-2009 and applies the vector autoregression model (VAR), decomposes the variance (variation) and analyses the impulse response of each of several independent variables. Berisha and Meszaros (2020) also prove that **income growth** and interest rates have a negative and significant impact on wealth inequality in the USA.

The results from the research reviewed show that apart from inflation, **financial deepening, interest rates and financial intermediation** are also revealed as important factors having a significant positive effect on wealth inequality. **The interest rate** is primarily identified as an inequality-increasing factor (e.g., Peshev et al. (2019), Stewart (1939), Domanski et al. (2016), etc.). Berisha and Meszaros (2020) reach opposite conclusions in their study. They conclude that rising interest rates contribute to lower wealth inequality in the USA.

Banking crises are also identified as a factor that reduces wealth inequality by Peshev et al. (2019) and Roine and Waldenström (2015), despite the differences in methodology and territorial scope of the papers. Peshev et al. (2019) also prove that the **global economic crisis** reduced wealth inequality in Bulgaria, which is not confirmed by other studies. Galbraith and Lu (1999) examine the relationship between crises and wealth inequality. They find that economic crises can lead to rising inequalities in wealth and income.

Stock prices are demonstrated in the empirical literature as a factor that is positively related to wealth inequality, while **housing prices** have the opposite effect. (See Peshev et al. (2019), Domanski, et al. (2016), Davies et al. (2011), Kuhn et al. (2020), etc.). Domanski et al. (2016) examine the relationship between monetary policy and inequality in the distribution of net wealth, interest rates and real and financial asset prices. The authors use microdata from household surveys for six countries: France, Germany, Italy, Spain, the United Kingdom and the United States. The study uses a simulation of the dynamics and distribution of wealth based on the quintile distribution. The research shows that rising stock prices can lead to an increase in wealth inequality that is only partially offset by the recovery in housing prices, where the middle class is more exposed. Kuhn et al. (2020) assume stock prices increase the wealth share of the top decile in the US, while house prices reduce it. Peshev et al. (2019) prove that house prices have a small but negative impact on inequality in the long run in Bulgaria. Due to the high share of owner-occupied housing in Bulgaria, the rise in house prices led to an increase in the size of the middle class in the 2005-2017 period. Using reweighted Oaxaca-Blinder-like decompositions based on recentered influence function (RIF) regression, Brzezinski and Sałach (2021) show that the differences in homeownership rates account for up to 42% of the difference in wealth inequality in CEE measured with the Gini index. Baselgia and Martinez (2020) point out that **housing prices** have become an important driver of wealth accumulation. Using a panel regression framework and data for 12 countries over the period 1990-2018, they find that a one percent annual increase in housing prices is associated with a 0.31% increase in the wealth-income ratio (but not in Germany and Sweden). Interesting results in this area are also shown by Fuller et al. (2020)

for Western Europe and other OECD countries. The study demonstrated that real housing inflation leads to an increase in the wealth-to-income ratio. The dynamics of this ratio could be explained by various determinants, including the rate of return of various assets (Jorda et al., 2017), its relationship with economic growth, the rate of savings, the structure and distribution of the portfolios and the volatility of their prices. For example, Kuhn et al. (2017) proved that until the housing bust of 2007, the American middle class enjoyed substantial gains in housing wealth and thus suppressed the growth of wealth concentration. In general, housing prices have a mixed impact on wealth accumulation. This can be explained by waves of industrialization, deindustrialization (after the 1970s) and urbanization, as well as by differences in housing policies in individual countries (Maclennan and Miao, 2017).

There is some evidence in the empirical literature on the role of **public expenditure** in reducing income inequality. In the case of examining the role of total government expenditure on income inequality, different country samples, methods, time periods, etc. are used. Malla and Pathranarakul (2022) prove that government size is negatively associated with income inequality in developed countries. This relationship is also demonstrated by Fournier and Johansson (2016) for OECD countries. Moreover, some authors distinguish between the role of different types of expenditure on income inequality. After reviewing 84 separate studies with over 900 estimates of the effects of one or more measures of government spending on one or more measures of income inequality, Anderson et al. (2016) conclude that there is ample evidence that at least some types of government spending have tended to reduce income inequality in many countries. Examining developed countries, Alfonso et al. (2008) come to the conclusion that public redistributive spending (with the exception of pensions) and educational performance have a significant impact on income distribution. Malla and Pathranarakul (2022) prove that education and health expenditures are negatively associated with income inequality in developed countries. According to Johansson (2016) for OECD countries, social spending can reduce inequality as it increases redistribution and risk sharing. **Taxation** can also influence wealth inequality. The importance of this factor is explored in more detail in numerous studies (e.g., Hubmer et al. (2018), Brülhart et al. (2016), Gokhale et al. (2001) and Peshev et al. (2019)). Peshev et al. (2019) prove that in Bulgaria the introduction of proportional taxes with a uniform (flat) rate on income reduces wealth inequality. In contrast, in a study of inequality in the distribution of wealth in the United States, Hubmer et al. (2018) consider the reduction in progressive income tax rates that began in the late 1970s as the main factor behind rising inequality.

The relationship between **educational** and wealth inequality is examined in some research (e.g., Poterba et al. (2018), Pfeffer and Schoeni (2016), Lusardi et al. (2017), etc.), but it is unclear whether there is a causal relationship (except for financial education). Further, **inheritance** is considered an important factor with a positive impact on inequality in wealth distribution (e.g., Niimi and Horioka (2016), Elinder et al. (2016), Gokhale et al. (2001), etc.).

The influence of a wide range of factors on inequality in the distribution of wealth has been demonstrated in the literature. Determinants differ from country to country due to different traditions, demographics, political and economic systems. The study of the factor determinants of wealth inequality in the CEE countries is not sufficiently developed, but the literature review identifies some important factors such as inflation, interest rates, stock

prices, house prices, economic crises, public expenditure, taxation, etc., which will serve as a basis for the methodology of the econometric analysis.

3. Data and Methodology of the Research

Hypotheses testing and empirical literature review support the data selection process, however, although data availability and preliminary statistical tests narrow the choice of variables.

We use an unbalanced panel of data macroeconomic data of dependent and explanatory variables of 11 CEE countries, members of the EU (Bulgaria, Czech Republic, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia), for the period between 1995 and 2021, constrained by data availability. Table 1 presents information on the dependent and independent variables of the study. Dependent variables comprise: GINI, P0P50, P50P90, P90P100, P99P100, while explanatory variables encompass: D1, DEPOSITRATE, GDPPERCAPITAPPS_100, GOVBONDSYIELDS, INFLATION, LOANSRATE, LOG(HPR), LOG(STOCKINDEX), POPULATION, UNEMPLOYMENTRATE.

Various unit root test results (Fisher-ADF, Fisher-PP, Im, Pesaran et al., 2001) suggest that GOVBONDSYIELDS, POPULATION and UNEMPLOYMENTRATE variables do not have unit roots at levels while the rest of the variables have unit roots at the level and are stationary at their first differences. Another specific of our data is that T is larger than N, or the number of countries is smaller than the time series length.

Table 1. Dependent and independent variables

Variable	Type	Description
D1	independent	2009 Great recession dummy variable, accepting "0" values before 2009 and "1" afterwards
DEPOSIT RATE	independent	households' deposit rates source of data: national central bank and European central bank
GDPPERCAPITAPPS_100	independent	volume index of GDP per capita in Purchasing Power Standards (PPS), expressed in relation to the European Union average set to equal 100
GINI	dependent	Gini coefficient
GOVBONDSYIELDS	independent	yield to maturity of 10-year government bonds or the best substitute bond with the closest to that time to maturity
GOVEXPTOGDP	independent	consolidated government expenditures to GDP
INFLATION	independent	yearly change of CPI index
LOANSRATE	independent	households' mortgage loan rates
LOG(HPR)	independent	index of house prices
LOG(STOCKINDEX)	independent	major stock market benchmark values as of the end of the year
P0P50	dependent	bottom half of wealth distribution
P50P90	dependent	the wealth share of 50th to 90th percentiles
P90P100	dependent	the wealth share of the top decile, the source of data
P99P100	dependent	the wealth share of the top percentile
POPULATION	independent	the wealth share of end-of-year population value, in mln.
UNEMPLOYMENT RATE	independent	unemployment rate

Correlation matrix coefficients and p-values, placed in Table A4 and Table A5 in the Appendix, suggest the absence of multicollinearity and reveal that there is not strong association (negative or positive) between explanatory and dependent variables. Neither correlation coefficient is having a meaning above 0.5 or below -0.5, and most of the correlation coefficients have p-value above 5% level of significance.

Descriptive statistics

Data analysis confirms a wealth concentration process is underway, analysing the 1995-2021 wealth inequality data, revealed in Table A1 in the Appendix. The Gini coefficient advances from 0.73 to 0.752 on average during the period under review. The wealth share of the top decile and more considerably of the top percentile also grow, from 56.7% to 59.2% for the top decile and from 22.2 to 26.1% for the top percentile. On the contrary, the middle class and the bottom half of the population reduce their share of total net wealth, from 38.5 to 36.4% for the p50p90 percentiles, and from 4.9 to 4.45% for the bottom half, respectively.

Dependent variables' analysis suggests a heterogenous development path of wealth concentration and overall distribution measures. The Gini coefficient rises in Bulgaria, Czech Republic, Hungary, Poland, Romania, Lithuania, Slovakia, and Slovenia, while the indicator declines in value in Hungary, Estonia, and Latvia.

The Gini coefficient experiences a small dispersion, having a few percentage points change (up to 2-3 p.p.), while having a larger change in Hungary, Latvia, Slovakia, and Slovenia. The share of the top percentile advances for 10 of the countries but in Croatia, where it declines modestly. The wealthiest percentile owns on average 24% of total wealth, also experiencing a steady uptrend (see Table A1 in the Appendix). The Gini coefficient is having largest values in Estonia, Poland and Hungary, in the range between 0.80 and 0.85.

The highest surge in wealth concentration surge (measured by the wealth share of the top percentile) appears in Hungary (from 24 to 34%), Poland (from 24 to 30%), Slovakia (from 13 to 18%) and Slovenia (from 12 to 23%). The wealthiest decile owns on average 57.6% of total wealth, maintaining an upward dynamic and starting from 56.7% in 1995 and ending in 2021 with a 59.2% share (see Table A1 in the Appendix). In all countries, the wealth share of the top decile increases, except Latvia, Estonia and Croatia. The steepest upward dynamics are evident in Hungary, Slovakia and Slovenia rising by around 10 pp. The top decile owns above 60% of the total net wealth in Estonia, Poland, Latvia and Hungary.

The P50p90 percentile owns on average 38% of total wealth, representing the wealth share of the so-called "middle class". The wealth share of the P50p90 percentile declines on average, from 38.5 to 36.4% (see ibid.). Middle-class wealth is shrinking the fastest in Hungary, Slovenia, the Czech Republic and Poland, while increasing in Latvia, Estonia and Croatia.

The Gini coefficient values, the top percentile and the top decile values and dynamics signal for growing inequality for the CEE countries part of the EU, with few exceptions. Another confirmation of the growing wealth concentration is the value and the dynamics for the wealth share of the bottom half of the population, which owns on average below 5% of total

net wealth, declining from 4.9% at the beginning of the period to 4.4% as of the end, as shown on Table A1 in the Appendix. The indicators advance in Latvia, Estonia and Poland, and move sideways in Croatia and Lithuania, while deteriorating in Bulgaria, Czech Republic, Hungary, Romania, Slovakia and Slovenia. The net wealth of the bottom half of the population is negative in Poland and has a value of around 1% in Estonia. The indicators have the highest value for Slovakia.

Tables A6 to A8 in the Appendix reveal descriptive statistics for explanatory and dependent variables. Common sample calculations suggest P50P90, GDPPERCAPITAPPS_100, GOVEXPTOGDP, Log(HPR) have the chance to accept the null, i.e. their skewness and kurtosis matching a normal distribution. The median and the mean meanings are almost perfect matches for the GINI, P0P50, P50P90, P90P100, P99P100, GDPPERCAPITA, PPS_100, GOVBONDSYIELDS, GOVEXPTOGDP, GOVBONDSYIELDS, GOVEXPTOGDP variables. Following variables experience the largest dispersion around the mean: POPULATION, DEPOSITRATE, INFLATION, GOVBONDSYIELDS, P0P50, LOANSRATE and UNEMPLOYMENTRATE.

Methodology

We use linear-linear and linear-log regression, respectively Least squares equations and Generalized method of moments equations, laid out in the following section, eq. 2-11.

$$Yit\text{-}n=\beta_0+\beta_1 Xit\text{-}n+\beta_2 Zi+Uit \quad (1)$$

where:

Yit – dependent variable for i^{th} NUTS 2 region in t^{th} period;

β0 – constant;

β1 – kx1 a matrix of parameters representing the association between the independent variable Xit and dependent variable Yit;

β2 – matrix of parameters representing the association between the independent variable Zi (representing individual effects for a specific i^{th} country) and the dependent variable Yit;

Zi – variable for individual (fixed) effects for the i^{th} country, irrespective of time;

Xit – an independent variable Xit for i^{th} country in t^{th} period;

n – time period index notation, accepting values between 0 and T;

t – time period variable;

$U_{it}\neg$ – error term.

Since some of our data possess non-stationarity features, we decided to address potential heteroscedasticity and serial correlation issues by using the Generalized Method of Moments (GMM) under the Blundell and Bond approach (1998). The GMM approach uses the

following instrumental variables: LOANSRATE, GOVEXPTOGDP, GOVBONDSYIELDS, GDPPERCAPITAPPS_100, D1, LOG(HPR), INFLATION, LOG(STOCKINDEX), INVESTTOGDP, UNEMPLOYMENTRATE. Besides instrumental variables explained in Table 1, we add also government expenditures to GDP variable- GOVEXPTOGDP and gross capital formation to GDP variable- INVESTTOGDP. GMM results are meant to confirm or oppose Least squares results addressing unbalanced panel data with N>T. Individual coefficient significance and overall model reliability coefficient values as well support LS results.

4. Results

The current section of the study presents and analyses main findings from the econometric study. Least squares regression and GMM results are summarized in Table 2 in current section and detailed equations are revealed in the Appendix. Equations with the Gini coefficient as dependent variable come first, followed by the top percentile, top decile, the P50P90 percentiles, and the bottom half of the population dependent variables' regression equations.

The Gini coefficient maintains a negative association with interest rates on loans on mortgage loans and GDP per capita in PPS with EU average=100, assuming that higher GDP per capita and higher interest rates on loans restore equality, with their coefficient being significant at 1% level of significance(see eq. 2). On other hand, the Great recession dummy supports the hypothesis that the 2009 recession and its aftermath resulted in higher wealth concentration. Inflation and house prices have a positive association with the Gini coefficient, assuming that higher house prices and higher consumer prices support the wealth creation for the upper deciles and percentiles at the expense of the bottom deciles and percentiles from the wealth distribution. The GMM regression results reveal the same direction of associations between the same dependent and explanatory variables (see eq. 3). House prices, the financial crisis and inflation contributed to wealth inequality among the 11 analysed CEE countries. The underdeveloped capital market and its insignificant meaning in the CEE countries and the large component of real estate wealth make wealth inequality more dependent on real estate. Higher interest rates deteriorate debt servicing and house prices, leading to higher wealth equality in analysed countries. Real GDP growth and convergence to EU averages restore equality assuming that redistribution policies and effects benefit more equal wealth distribution.

Eq. 4 reveals that the top percentile has a negative relationship with the interest rates on mortgage loans of households, the GDP per capita in PPS terms and government bonds yields, with their coefficient being significant at a 1% level of significance. The 2009 recession dummy and the natural logarithm of house prices experience a positive association with the dependent variable, assuming that both variables support wealth concentration (see eq. 4). The same relationships are evident from the GMM regression presented in eq. 5. The top percentile's wealth share is supported by a higher house and bond prices (lower government bond yields), and by the 2009 crisis, while interest rates on loans and GDP real

growth and EU convergence decrease the top 1% wealth share. The same logic for interest rates and GDP per capita in PPS applies as in eq. 2 and eq. 3.

The wealth of the top decile is in positive association with house prices and the population, meaning, while having a negative relationship with interest rates on deposits and stock market prices, as can be seen in eq. 6. and eq. 7. Stock prices are supposed to contribute to wealth concentration, but our results oppose this hypothesis, as the coefficient for stock market prices is very small and has a negligible negative impact. All coefficients in eq. 7 are significant at a 1% level of significance, however in eq. 6, all coefficients are significant at a 1% level of significance, but the interest rates on deposits' coefficient which is significant at a 5% level of significance. The insufficient capital market penetration in the economy and the importance of the real estate component for wealth creation could partially explain the negative association between stock prices and the wealth of the top decile. Growth of the population stimulates wealth concentration, suggesting that the wealthiest individual takes advantage when the population grows.

The middle class, in our view, encompasses the population of the p50p90 percentile. Eq.8 and eq.9 reveal the association between the p50p90, as a dependent variable, and the explanatory variables. GDP per capita in PPS (EU average = 100) and the households' interest rate on deposits maintain a positive association with the dependent variable (see eq. 8 and eq. 9). On the contrary, house prices and the 2009 recession experience a negative association with the dependent variables. GDP real growth and interest rates on deposits seem to stimulate the growth of the wealth share of the middle class, while house prices and the 2009 structural break due to the recession seem to deteriorate it. The wealth of the middle class deteriorates with higher house prices and probably with lower interest rates which stimulated asset inflation. It could be assumed that the net real estate of the middle class grows much slower in value in comparison to the wealthiest decile and percentile and wealthier people better take advantage when interest rates in the economy fall. All coefficients in the Least squares and GMM equations are significant at a 1% level of significance.

The P0P50 dependent variable represents the bottom half of households' wealth. The dependent variable is in positive association with the GDP per capita in PPS (EU average = 100), interest rates on mortgage loans and stock prices (see eq. 10 and eq. 11). House prices decrease the wealth of the bottom half of the population. All variables' coefficients but the constants are significant at the 1% level significance (see eq. 10 and eq. 11). It should be noted that both equations don't possess normal distribution, since the p-value for the null hypothesis of the Jarque-Berra test equals zero. From another perspective, F-stat and Sargan-Hansen test J-stat value and p-valued support the overall models' significance. To put it differently, higher mortgage rates and lower house prices stimulate the wealth share for the bottom half of the households since they own a small portion of overall wealth, and probably it is due to an indirect association between dependent and independent variables. It could be because of the net wealth's faster deterioration for the upper half of the distribution. It should be noted that stock markets in the eleven CEE countries don't share many of the features of developed stock markets. Lower stock prices reduce the wealth share of the bottom half of households, and vice versa, which at first glance is not logical since the bottom half rarely owns stock or has direct exposure towards the stock market.

Our results are consistent with research that identifies GDP growth, housing prices, inflation and financial crises as the main determinants of inequality, but highlight different patterns. The main result of the research is related to the impact of house prices on inequalities.

In principle, housing wealth is more equally distributed than financial assets. Our result suggests that the increase in house prices has a negative impact on the wealth share of the middle class and the poorer households. In this respect, the study differs from Peshev (2019), according to which the rise in house prices leads to an increase in the size of the middle class. (We are not aware of any other similar studies for the region with which a direct comparison can be made.) Based on broader studies of housing wealth (e.g., Maclennan and Miao, 2017), it can be concluded that by the end of the 20th century, home ownership contributed to the savings of the poorer households and the middle class. In recent years, this dependence has been breaking down (supporting the observation of Kuhn et al., 2017) – especially in those countries and during those periods in which house price growth outpaced income growth. The different levels of home ownership which are higher in CEE compared to Western European countries (see Leitner and Holzner (2008) and Brzezinski and Sałach (2021)), as well as regional inequalities in the process of structural transformation of economies also matter.

As in Peshev et al. (2019), the impact of interest rates and inflation is mixed, especially in the longer term. On the other hand, the impact of stock prices does correspond to the predictions based on the literature review.

It is necessary to point out that wealth inequality in CEE is poorly studied (because of the lack of high-quality wealth data) and there is uncertainty in the obtained estimates, which also affects the results of the regression analysis.

Hypotheses tests suggest: 1. The growth and convergence of GDP in PPS to the EU averages actually decreases inequality rejecting the stated hypothesis that higher economic development leads to higher inequality, justified by eq. 2 to 5 and eq. 8 to 11. Our results rather support a Kuznets (1995) inverted U-shaped inequality curve; 2. The 2009 dummy variable is maintaining a negative association with the middle class's wealth and stimulates inequality, as shown in eq. 2 to eq. 5 and deteriorates the wealth of the middle class (see eq. 8 and eq. 9), failing to reject the hypothesis, stated in the introduction; 3. Wealth concentration and house prices are in positive association, while the middle class's wealth decreases with higher house prices, rejecting the hypothesis of the middle class's wealth positive association with real estate prices, see eq. 2 to 11. House prices appear to be the strongest wealth inequality determinant; 4. Stock prices are associated with lower wealth inequality, rejecting the stated hypothesis in the introduction (see eq. 6 and 7 and eq. 10 and 11); 5. We fail to reject the hypothesis that higher interest rates on households' loans and deposits are expected to decrease wealth concentration by lowering prices of financial and real assets and increasing the cost of servicing debts, as can be seen in eq. 2 to 11; 6. In the same, we fail to reject the hypothesis stating that lower government bond yields and higher bond prices increase inequality. (see eq. 4 and eq. 5.); 7. We also fail to reject the hypothesis that inflation leads to higher wealth inequality, evident from eq. 2 and eq. 3. Consumer price change is expected to increase wealth concentration by transferring wealth from creditor to debtor and due to increasing financial and real assets' prices. Population growth is supposed

to increase wealth concentration by allowing fewer individuals to take advantage of the growing population.

Table 2. Regression results

Equation	(eq.2)	(eq.3)	(eq.4)	(eq.5)	(eq.6)	(eq.7)	(eq.8)	(eq.9)	(eq.10)	(eq.11)
Method	LS	GMM	LS	GMM	LS	GMM	LS	GMM	LS	GMM
Dependent variable	GINI	GINI	P99P100	P99P100	P90P100	P90P100	P50P90	P50P90	P0P50	P0P50
Explanatory variables										
Constant	0.756	0.78	0.16	0.16	0.481	0.27	0.47	0.46	0.03	0.012
LOANSRATE	-0.003	-0.005	-0.002	-0.002				0.004	0.001	0.002
DEPOSITRATE					-0.002	-0.008	0.001			
GDPPERCAPITAPPS_100	-0.002	-0.002	-0.002	-0.002			0.001	0.001	0.001	0.001
GOVBONDSYIELDS			-0.003	-0.003						
LOG(STOCKINDEX)					-0.009	-0.026			0.005	0.005
LOG(HPR)	0.022	0.022	0.042	0.04	0.031	0.0377	-0.035	-0.036	-0.013	-0.013
D1	0.016	0.013	0.094	0.016			-0.011	-0.007		
INFLATION	0.002	0.001								
POPULATION					0.003	0.036				
Summarized results										
Adjusted R^2	0.23		0.37		0.13		0.26		0.11	
F-stat	13.3		24		9		20.3		7.44	
p-val	*0*		*0*		*0*		*0*		*0*	
The Sargan–Hansen test J-stat		6.22		6.28		7.29		7.7		6.28
p-val		*0.28*		*0.39*		*0.29*		*0.26*		*0.39*
Jarque-Berra test	0.71		4.04		2.17		4.56		4.04	
p-value	*0.79*		*0.13*		*0.33*		*0.11*		*0*	

Source: Own calculations.

5. Conclusions

This scientific article analysed wealth inequality dynamics drivers in the 11 EU countries from the CEE region (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia) for the 1995-2021 period. After a brief literature review, a descriptive analysis was performed. Descriptive results suggest a common upward dynamic in inequality is underway, although a heterogeneous path of development for some of the countries is evident. Wealth concentration grows over the period under review, with the Gini coefficient, wealth shares of the top deciles and specifically the top percentile increasing in value, while the bottom half of the population and the middle classes' wealth deteriorates.

Least squares and GMM regression results suggest that real and financial assets, consumer prices, various interest rates, GDP per capita in PPS terms, and the Great Recession impact the wealth inequality (dependent) variables. House prices, Consumer prices, the 2009 Great Recession dummy and population count are among the contributors to higher wealth inequality. GDP per capita in PPS (EU = 100), interest rates on households' loans and deposits and government bond yields improve equality of net wealth distribution due to direct

and indirect effects in the economy and on asset prices. Stock prices in the CEE countries have a very small and positive impact on the bottom half of the population, despite the fact that the bottom half of the population (probably indirectly, through pension and other funds), usually has low exposure to the local stock market.

Rising wealth inequality in the CEE is in line with the global wealth inequality upward trend, which requires an appropriate response. Further analysis is needed, as in many countries the financial crisis coincided with the start of consuming the benefits of EU membership. The main findings of this paper can support the knowledge in the field but also can help addressing wealth inequality.

Drivers of wealth inequality can be subject to wealth inequality mitigating policy. Besides common policies for tackling wealth inequality, several policy implications could be derived from the results of the study. First, imposing a heterogenous and progressive tax on real estate wealth is in position to decrease wealth inequality in the CEE region, since housing wealth is in strong positive association with wealth concentration indicators analysed. Second, stimulating economic growth and achieving effective income redistribution among poorer society members has the potential to lower wealth inequality. Third, giving access of poorer households to equities, through mutual funds, mandatory private pension funds, mass privatization of minority shares of large state-owned companies meant for retail investors and other similar policies have the potential to increase the wealth of the middle class and of the bottom 50%. Fourth, economic crises caused by various events should be assigned policies for better supporting the middle class and the bottom half of households and individuals.

References

Alfonso, A., Schuknecht, L., Tanzi, V. (2008). Income Distribution Determinants and Public Spending Efficiency. – Working paper Series № 861, European Central Bank.

Alvaredo, F., Atkinson, A. B., Blanchet, T., Chancel, L., Bauluz, L., Fisher-Post, M., Flores, I., Garbinti, B., Goupille-Lebret, J., Martínez-Toledano, C., Morgan, M. (2020). Distributional National Accounts Guidelines, Methods and Concepts Used in the World Inequality Database. World Inequality Lab.

Anderson, E., Jalles d'Orey. M. A., Duvendack, M., Esposito, L. (2016). Does Government Spending Affect Income Inequality? A Meta-Regression Analysis. – Journal of Economic Surveys, 31(7), pp. 961-987.

Berisha, E., Meszaros, J. (2020). Macroeconomic determinants of wealth inequality dynamics. – Economic Modelling, 89, pp. 153-165.

Baselgia, E., Martinez, I. (2020). A Safe Harbor: Wealth-Income Ratios in Switzerland over the 20th Century and the Role of Housing Prices. – World Inequality Lab WP 2020/28.

Berman, Y., Milanovic, B. (2020). Homoploutia: Top Labor and Capital Incomes in the United States, 1950-2020. – World Inequality Lab WP 2020/27.

Blundell, R., Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. – Journal of Econometrics, 87(1), pp. 115-143.

Bricker, J., Henriques, A., Krimmel, L., Sabelhaus, J. (2016). Measuring Income and Wealth at the Top Using Administrative and Survey Data. – Brookings Papers on Economic Activity, 47, pp. 261-331.

Brülhart, M., Gruber, J., Krapf, M., Schmidheiny, K. (2016). Taxing wealth: evidence from Switzerland (No.w22376). National Bureau of Economic Research.

Brzezinski, M., Sałach, K., Wroński, M. (2019). Wealth inequality in Central and Eastern Europe: evidence from joined household survey and rich lists' data. – Working papers 9/2019, University of Warsaw, Faculty of Economic Sciences.

Brzezinski, M., Sałach, K. (2021). Factors that account for the wealth inequality differences between post-socialist countries. – Economic Modelling 105 (2021): 105649.

Caprio, G., Klingebiel, D. (2002). Episodes of systemic and borderline financial crises. Managing the real and fiscal effects of banking crisis. – Discussion Paper, 428.

Chancel, L., Piketty, T., Saez, E., Zucman, G. (2022). World Inequality Report 2022.

Colciago, A., Samarina, A., de Haan, J. (2019). Central bank policies and income and wealth inequality: A survey. – Journal of Economic Surveys, 33(4), pp. 1199-1231.

Davies, J. B., Sandstrom, S., Shorrocks, A. F., Wolff, E. N. (2011). The level and distribution of global household wealth. – Economic Journal, 121, pp. 223-254.

Domanski, D., Scatigna, M., Zabai, A. (2016). Wealth inequality and monetary policy. – BIS Quarterly Review March.

Elinder, M., Erixson, O., Waldenström, D. (2016). Inheritance and wealth inequality: Evidence from population registers. – IFN Working Paper No. 1121.

Fournier, J., Johansson, A. (2016). The Effect of the Size and the Mix of Public Spending on Growth and Inequality. – OECD Economics Department Working Papers, No. 1344, OECD Publishing, Paris.

Fuller, G. W., Johnston, A., Regan, A. (2020). Housing prices and wealth inequality in Western Europe. – West European Politics, 43(2), pp. 297-320.

Galbraith, J. K., Lu, J. (1999). Inequality and financial crises: Some early findings. Inequality and Industrial Change: A Global View.

Garbinti, B., Goupille-Lebret, J., Piketty, T. (2021). Accounting for Wealth-Inequality Dynamics: Methods, Estimates and Simulations for France. – Journal of the European Economic Association, 19(1), pp. 620-663.

Gokhale, J., Kotlikoff, L. J., Sefton, J., Weale, M. (2001). Simulating the transmission of wealth inequality via bequests. – Journal of Public economics, 79(1), pp. 93-128.

Hubmer, J., Krusell, P., Smith Jr., A. A. (2018). A comprehensive quantitative theory of the US wealth distribution. Working paper.

Johansson, A. (2016). Public Finance, Economic Growth and Inequality: A Survey of Evidence. – OECD Economics Department Working Papers, No. 1346, OECD Publishing, Paris.

Jorda, O., Knoll, K., Kuvshinov, D., Schularick, M., Taylor, A. (2017). The Rate of Return on Everything, 1870-2015. – NBER Working Paper No. 24112.

Kuhn, M., Schularick, M., Steins, U. I. (2020). Income and wealth inequality in America, 1949-2016. – Journal of Political Economy, 128(9), pp. 3469-3519.

Kuznets, S. (1955). Economic growth and income inequality. – The American economic review, 45(1), pp. 1-28.

Leitner, S., Holzner, M. (2008). Economic Inequality in Central, East and Southeast Europe. – European Journal of Economics and Economic Policies, Vol. 5, N 1, pp. 155-189.

Lusardi, A., Michaud, P. C., Mitchell, O. S. (2017). Optimal financial knowledge and wealth inequality. – Journal of Political Economy, 125(2), pp. 431-477.

Maclennan, D., Miao, J. (2017). Housing and Capital in the 21st Century, Housing. – Theory and Society, 34:2, pp. 127-145.

Malla, M., Pathranarakul, P. (2022). Fiscal Policy and Income Inequality: The Critical Role of Institutional Capacity. – Economies, 10:115, pp. 1-16.

Milanovic, B. (2019). Capitalism, alone. Harvard University Press.

Niimi, Y., Horioka, C. Y. (2016). The impact of intergenerational transfers on household wealth inequality in Japan and the United States (No. w22687). National Bureau of Economic Research

Pesaran, M., Shin, Y., Smith, R. (2001). Bounds testing approach es to the analysis of level relationships. – Journal of Applied Econometrics, 16, pp. 289-326.

Peshev, P. (2015). Analysis of the wealth inequality dynamics in Bulgaria: Different approach. – Economic Alternatives Journal, (4), pp. 29-33.

Peshev, P., Stattev, S., Stefanova, K., Lazarova, M. (2019). Financial Wealth Inequality Drivers in a Small EU Member Country: An Example from Bulgaria during the Period 2005-2017. – Economic Studies journal, (2), pp. 41-72.

Pfeffer, F. T., Schoeni, R. F. (2016). How wealth inequality shapes our future. RSF: The Russell Sage Foundation. – Journal of the Social Sciences, 2(6), pp. 2-22.

Piketty, T., Zucman, G. (2014). Capital Is Back: Wealth-Income Ratios in. Rich Countries 1970-2010. – The Quarterly Journal of Economics, Vol. 129, N 3, pp. 1255-1310.

Poterba, J., Venti, S., Wise, D. A. (2018). Longitudinal determinants of end-of-life wealth inequality. – Journal of public economics, 162, pp. 78-88.

Stewart, C. (1939). Income capitalization as a method of estimating the distribution of wealth by size groups. – Studies in Income and Wealth, Vol. 3, pp. 95-146.

Reinhart, C., Rogoff, K. (2013). This Time is Different.Eight Centuries of Financial Folly. Sofia: Ciela (in Bulgarian).

Roine, J., Waldenström, D. (2015). Long run trends in the distribution of income and wealth. – Uppsala Center for Fiscal Studies Department of Economics. Working Paper 2014:5.

Vermeulen, Ph. (2014). How fat is the top tail of the wealth distribution?. – ECB Working Paper, N 1692, European Central Bank (ECB), Frankfurt a. M.

Other sources:

The World Inequality Database (WID.world), Accessed 1/12/2022.

Household Finance and Consumption Network (2020) : The Household Finance and Consumption Survey: Results from the 2017 wave, ECB Statistics Paper, No. 36, European Central Bank (ECB), Frankfurt,https://ec.europa.eu/eurostat/databrowser/view/ILC_LVHO02__custom_1513577/bookmark/table?lang=enandbookmarkId=776c7a00-1a0a-4818-aeae-8c08024912a9 Accessed 13/12/2022.

WEO of IMF, https://www.imf.org/en/Publications/WEO.

Eurostast, https://ec.europa.eu/eurostat.

https://www.investing.com/markets/.

APPENDIX

Table A1. Dependent variables averages (%)

YEAR	GINI	P90P100	P50P90	P0P50	P99P100
1995	73.4	56.7	38.5	4.9	22.2
1996	73.3	56.5	38.6	4.9	22.0
1997	73.3	56.5	38.6	4.9	22.0
1998	73.3	56.5	38.6	4.9	22.0
1999	73.3	56.5	38.6	4.9	22.0
2000	73.4	56.6	38.6	4.9	22.1
2001	73.4	56.6	38.5	4.9	22.1
2002	73.5	56.8	38.4	4.8	22.3
2003	73.5	56.9	38.3	4.8	22.4
2004	73.6	56.9	38.3	4.8	22.4
2005	73.7	57.1	38.1	4.8	22.6
2006	73.6	57.0	38.2	4.8	22.5
2007	73.8	57.2	38.0	4.8	22.8
2008	73.8	57.2	38.0	4.8	22.8
2009	73.6	57.0	38.2	4.8	22.5
2010	73.6	56.9	38.3	4.8	22.5
2011	73.8	57.3	38.0	4.7	23.0
2012	74.3	57.7	37.7	4.6	23.6
2013	74.6	58.1	37.5	4.4	24.2
2014	74.9	58.6	37.1	4.3	24.9
2015	74.9	58.6	37.0	4.4	25.2
2016	74.8	58.7	36.9	4.4	25.4
2017	74.6	58.5	36.8	4.7	25.5
2018	74.5	58.9	36.2	4.9	26.2
2019	75.1	59.1	36.5	4.4	26.0
2020	75.1	59.1	36.5	4.4	26.0
2021	75.2	59.2	36.4	4.4	26.1

Source: WID.world

Table A2. Explanatory variables averages

YEAR	GOVBONDS YIELDS	DEPOSIT RATE	INFLATION	LOANS RATE	GDPPER CAPITAPPS_100	UNEMPLOYMENT RATE
1995		10.56	23.41	10.48		
1996		9.84	26.70	11.30		
1997		9.30	118.36	11.02		10.98
1998		9.47	14.02	12.12		9.90
1999		9.62	8.64	11.65		11.19
2000		13.27	10.27	20.69	48.00	12.92
2001	8.12	9.51	8.19	16.62	49.82	13.16
2002	6.63	6.89	5.08	13.51	51.82	12.48
2003	5.60	4.98	3.84	10.58	54.55	11.55
2004	5.54	5.10	4.96	9.53	56.55	11.32
2005	4.29	3.30	4.08	6.82	58.91	10.19
2006	4.59	3.49	4.21	6.84	60.45	8.57
2007	4.96	4.17	5.16	7.17	63.18	6.95
2008	5.65	5.22	8.11	7.85	65.64	6.56
2009	7.46	4.84	2.62	7.51	63.91	10.05
2010	5.62	3.28	2.21	6.55	64.82	12.08
2011	5.36	3.30	3.71	6.03	66.36	11.39
2012	4.90	3.17	3.44	5.85	67.82	11.32
2013	3.91	2.30	1.68	5.19	68.64	11.05
2014	3.05	1.68	0.09	4.57	69.73	10.01
2015	2.01	1.19	-0.37	3.97	70.00	8.86
2016	1.78	0.80	-0.23	3.62	70.36	7.64
2017	1.70	0.61	2.14	3.34	71.73	6.42
2018	1.73	0.68	2.57	3.41	73.18	5.30
2019	1.25	0.69	2.47	3.37	74.45	4.62
2020	0.92	0.52	1.48	3.11	75.82	5.73
2021	1.03	0.43	3.79	2.84	76.91	6.00

Source: ECB, EUROSTAT, IMF, Investing.com, national Central bank and ministry of finance websites.

Table A3. Explanatory variables averages (continue)

YEAR	INVESTTOGDP	POPULATION	LOG(STOCKINDEX)	LOG(HPR)	GOVEXPTOGDP
1995	21.50	9.99	5.54		44.70
1996	23.22	9.97	5.74	3.78	43.66
1997	25.11	9.95	6.01	3.96	43.15
1998	25.99	9.92	5.74	4.09	42.93
1999	24.08	9.91	6.14	4.16	44.31
2000	24.62	9.85	5.95	4.25	43.67
2001	25.27	9.81	6.08	4.32	42.11
2002	25.35	9.73	6.16	4.38	42.16
2003	25.95	9.70	6.56	4.43	41.41
2004	27.02	9.68	7.00	4.46	40.25
2005	27.54	9.65	7.30	4.45	40.04
2006	30.17	9.63	7.51	4.52	40.01
2007	31.89	9.61	7.63	4.66	39.77
2008	30.64	9.56	6.75	4.74	41.09
2009	22.58	9.54	6.96	4.60	45.37
2010	22.40	9.51	7.08	4.57	43.96
2011	23.61	9.47	6.86	4.57	42.85
2012	22.71	9.45	6.97	4.55	41.88
2013	22.01	9.43	7.06	4.55	43.10
2014	22.44	9.41	7.07	4.58	42.56
2015	22.90	9.39	7.14	4.61	42.32
2016	21.54	9.37	7.26	4.66	40.35
2017	22.26	9.34	7.40	4.73	39.54
2018	23.45	9.32	7.34	4.81	40.09
2019	23.10	9.31	7.45	4.89	40.32
2020	22.26	9.30	7.41	4.95	46.30
2021	24.17	9.25	7.65	5.06	44.25

Source: ECB, EUROSTAT, IMF, Investing.com, national Central bank and ministry of finance websites

Table A4. Correlation coefficients

	GINI	P0P50	P50P90	P90P100	P99P100
DEPOSITRATE	-0.019	-0.008	0.083	-0.048	-0.136
GDPPERCAPITAPPS_100	-0.130	0.145	0.115	-0.148	-0.058
GOVBONDSYIELDS	-0.036	0.004	0.074	-0.049	-0.185
GOVEXPTOGDP	-0.176	0.197	0.203	-0.230	-0.176
INFLATION	0.091	-0.080	-0.156	0.140	0.067
LOANSRATE	-0.003	-0.022	0.034	-0.010	-0.096
LOG(HPR)	-0.067	0.094	-0.064	-0.008	0.069
LOG(STOCKINDEX)	0.277	-0.242	-0.326	0.331	0.325
POPULATION	0.438	-0.498	0.185	0.139	0.159
UNEMPLOYMENTRATE	-0.147	0.137	0.156	-0.170	-0.242
INVESTTOGDP	0.043	-0.026	-0.194	0.137	0.067

Source: Own calculations.

Table A5. P-values for accepting correlation coefficients

	GINI	P0P50	P50P90	P90P100	P99P100
DEPOSITRATE	0.791	0.915	0.247	0.499	0.056
GDPPERCAPITAPPS_100	0.068	0.042	0.107	0.038	0.417
GOVBONDSYIELDS	0.617	0.957	0.304	0.498	0.009
GOVEXPTOGDP	0.014	0.005	0.004	0.001	0.014
INFLATION	0.205	0.266	0.029	0.050	0.347
LOANSRATE	0.970	0.763	0.637	0.887	0.177
LOG(HPR)	0.349	0.189	0.372	0.912	0.336
LOG(STOCKINDEX)	0.000	0.001	0.000	0.000	0.000
POPULATION	0.000	0.000	0.009	0.052	0.026
UNEMPLOYMENTRATE	0.039	0.054	0.028	0.017	0.001
INVESTTOGDP	0.546	0.715	0.006	0.055	0.349

Source: Own calculations.

Table A6. P-values for accepting correlation coefficients

	GINI	P0P50	P50P90	P90P100	P99P100	GDPPERCAPITA PPS_100
Mean	0.7	0.05	0.4	0.6	0.2	68.0
Median	0.7	0.05	0.4	0.6	0.2	68.0
Maximum	0.9	0.1	0.4	0.7	0.3	93.0
Minimum	0.6	0.0	0.3	0.4	0.1	34.0
Std. Dev.	0.1	0.0	0.0	0.1	0.0	13.4
Skewness	-0.2	0.3	-0.1	-0.7	-0.5	-0.2
Kurtosis	3.8	4.7	3.0	4.0	3.9	2.5
Jarque-Bera	6.3	26.8	0.1	24.0	16.3	3.2
Probability	0.0	0.0	0.9	0.0	0.0	0.2
Sum	146.4	9.1	73.6	114.2	47.6	13403.0
Sum Sq. Dev.	0.7	0.2	0.3	0.6	0.4	34996.8
Observations	197	197	197	197	197	197

Notes: common sample calculations
Source: Own calculations.

Table A7. P-values for accepting correlation coefficients

	GOVBONDSYIELDS	GOVEXPTOGDP	INFLATION	LOANSRATE	DEPOSITRATE
Mean	3.7	42.2	2.9	5.4	2.4
Median	3.7	42.2	2.6	4.7	1.6
Maximum	14.0	60.3	15.3	15.2	12.9
Minimum	-0.1	33.2	-1.6	1.2	0.1
Std. Dev.	2.5	5.2	2.6	2.9	2.4
Skewness	0.7	0.2	1.2	1.2	1.5
Kurtosis	3.8	2.6	6.0	4.0	5.5
Jarque-Bera	19.3	3.6	123.0	52.7	127.7
Probability	0.0	0.2	0.0	0.0	0.0
Sum	724.5	8303.8	562.7	1069.7	481.6
Sum Sq. Dev.	1271.9	5296.2	1332.2	1622.7	1088.3
Observations	197	197	197	197	197

Notes: common sample calculations
Source: Own calculations.

Table A8. P-values for accepting correlation coefficients

	LOG(HPR)	LOG(STOCK INDEX)	POPULATION	UNEMPLOYMENT RATE	INVESTTO GDP
Mean	4.7	7.2	9.5	8.4	24.6
Median	4.6	6.9	5.4	7.4	23.6
Maximum	5.3	10.8	38.2	19.5	41.6
Minimum	4.1	5.3	1.3	2.0	12.7
Std. Dev.	0.2	1.3	10.2	3.6	4.9
Skewness	0.3	0.9	1.9	0.8	0.8
Kurtosis	3.5	3.2	5.6	3.3	4.0
Jarque-Bera	4.3	28.7	169.0	24.0	30.9
Probability	0.1	0.0	0.0	0.0	0.0
Sum	918.2	1425.7	1863.2	1651.0	4843.2
Sum Sq. Dev.	8.4	332.7	20386.3	2498.8	4649.2
Observations	197	197	197	197	197

Notes: common sample calculations
Source: Own calculations.

LEAST SQUARES AND GMM REGRESSION EQUATIONS

LS: GINI = 0.756*** – 0.003LOANSRATE*** – 0.002GDPPERCAPITAPPS_100*** + 0.016D1*** + 0.022LOG(HPR)** + 0.002INFLATION*** + [CX=R] (2)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: R-squared: 0.24; Adjusted R-squared: 0.23; F-statistic: 13.3; Prob. (F-statistic): 0.00. Jarque-Berra test value of 0.68 and p-value for the null hypothesis of the Jarque-Berra test of 0.71. The Hausmann test does not rule out the null, since the p-value is at 0.79, suggesting random effects models is appropriate.

GMM: GINI = 0.78*** – 0.005LOANSRATE*** – 0.002GDPPERCAPITAPPS_100*** + 0.013D1*** + 0.022LOG(HPR)** + 0.001INFLATION* + [CX=R] (3)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: The Sargan–Hansen test J-stat value comes at 6.22 with p-value of 0.28. Instrumental variables: LOANSRATE GOVEXPTOGDP GOVBONDSYIELDS GDPPERCAPITAPPS_100 D1 LOG(HPR) INFLATION LOG(STOCKINDEX) INVESTTOGDP UNEMPLOYMENTRATE

LS:P99P100 = 0.16*** – 0.002LOANSRATE** – 0.003GOVBONDSYIELDS*** – 0.002GDPPERCAPITAPPS_100*** + 0.094D1*** + 0.042LOG(HPR)*** + [CX=R] (4)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results R-squared:0.39; Adjusted R-squared; 0.37; F-statistic: 23.97; Prob. (F-statistic): 0.00. Jarque-Berra test value of 4.04 and p-value for the null hypothesis of the Jarque-Berra test of 0.13. The Hausmann test does not rule out the null, since the p-value is at 0.31, suggesting random effects models is appropriate.

GMM: P99P100 = 0.16*** – 0.002LOANSRATE** – 0.003GOVBONDSYIELDS*** – 0.002GDPPERCAPITAPPS_100*** + 0.016D1*** + 0.04LOG(HPR)*** + [CX=R] (5)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: The Sargan–Hansen test J-stat value comes at 6.28 with p-value of 0.39. Instrumental variables: LOANSRATE GOVEXPTOGDP GOVBONDSYIELDS GDPPERCAPITAPPS_100 D1 LOG(HPR) INFLATION LOG(STOCKINDEX) INVESTTOGDP UNEMPLOYMENTRATE

LS:P90P100 = 0.481*** – 0.002DEPOSITRATE** + 0.003POPULATION*** – 0.009LOG(STOCKINDEX)*** + 0.031LOG(HPR)*** + [CX=R] (6)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results R-squared: 0.15; Adjusted R-squared; 0.13; F-statistic: 8.98; Prob. (F-statistic): 0.00. Jarque-Berra test value of 2.17 and p-value for the null hypothesis of the Jarque-Berra test of 0.33. The Hausmann test does not rule out the null, since the p-value is at 0.99, suggesting random effects models is appropriate.

GMM: P90P100 = 0.27*** – 0.008DEPOSITRATE*** + 0.036POPULATION*** – 0.026LOG(STOCKINDEX)*** + 0.0377LOG(HPR)*** + [CX=R] (7)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: The Sargan–Hansen test J-stat value comes at 7.29 with p-value of 0.29. Instrumental variables: LOANSRATE GOVEXPTOGDP GOVBONDSYIELDS GDPPERCAPITAPPS_100 D1 LOG(HPR) INFLATION LOG(STOCKINDEX) INVESTTOGDP UNEMPLOYMENTRATE

LS: P50P90 = 0.47*** + 0.001GDPPERCAPITAPPS_100*** – 0.011D1*** – 0.035LOG(HPR)***+ 0.001DEPOSITRATE*** + [CX=R] (8)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results R-squared:0.28; Adjusted R-squared; 0.26; F-statistic: 20.3; Prob. (F-statistic): 0.00. Jarque-Berra test value of 4.56 and p-value for the null hypothesis of the Jarque-Berra test of 0.11. The Hausmann test does not rule out the null, since the p-value is at 0.78, suggesting random effects models is appropriate.

GMM: P50P90 = 0.46*** + 0.001GDPPERCAPITAPPS_100*** – 0.007D1** – 0.036LOG(HPR)*** + 0.004DEPOSITRATE*** + [CX=R] (9)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: The Sargan–Hansen test J-stat value comes at 7.69 with p-value of 0.26. Instrumental variables: LOANSRATE GOVEXPTOGDP GOVBONDSYIELDS GDPPERCAPITAPPS_100 D1 LOG(HPR) INFLATION LOG(STOCKINDEX) INVESTTOGDP UNEMPLOYMENTRATE

LS:P0P50 = 0.03* + 0.001LOANSRATE*** + 0.001GDPPERCAPITAPPS_100*** + 0.005LOG(STOCKINDEX)*** – 0.013LOG(HPR)*** + [CX=R] (10)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results R-squared:0.12; Adjusted R-squared; 0.11; F-statistic: 7.4; Prob. (F-statistic): 0.00. Jarque-Berra test value of 4.04 and p-value for the null hypothesis of the Jarque-Berra test of 0.00. The Hausmann test does not rule out the null, since the p-value is at 0.99, suggesting random effects models is appropriate.

GMM: P0P50 = 0.012 + 0.002LOANSRATE*** + 0.001GDPPERCAPITAPPS_100*** + 0.005LOG(STOCKINDEX)*** – 0.013LOG(HPR)*** + [CX=R] (11)

where:

* is 10% level of significance; ** – 5% level of significance; *** – 1% level of significance; Summarized results: The Sargan–Hansen test J-stat value comes at 6.28 with p-value of 0.39. Instrumental variables: LOANSRATE GOVEXPTOGDP GOVBONDSYIELDS GDPPERCAPITAPPS_100 D1 LOG(HPR) INFLATION LOG(STOCKINDEX) INVESTTOGDP UNEMPLOYMENTRATE