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## Article

# The relationship between household wealth and financial vulnerability in the post-communist countries of the Euro Area

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## The Relationship between Household Wealth and Financial Vulnerability in the Post-communist Countries of the Euro Area<sup>1</sup>

Ján BULECA – Nikola ŠUBOVÁ – Lenka MALIČKÁ\*

### Abstract

*The paper investigates the relationship between household wealth and financial vulnerability in the euro area member countries using data from the European Union Household Finance and Consumption Survey (HFCS). The instrumental variable regression model based on the two-stage least square method was used to elicit the role of household financial vulnerability in wealth accumulation. To consider different historical development and implementing social policies, the analysis considers the household location (post-communist countries according to the Warsaw Treaty and other European countries with a core in Western Europe). The analysis results emphasise the positive relationship between households' wealth accumulation and financial vulnerability represented by household indebtedness. Additional variables reflecting the households' socio-economic and demographic characteristics are statistically significant, too. Debt service-to-income ratio, statuses of employment (employed and self-employed), and age of the reference person squared were driving forces of wealth accumulation, while age of the reference person, number of dependent children, employment status (retired, other), and geographical location lower the level of household wealth.*

**Keywords:** wealth, indebtedness, financial vulnerability, households, post-communist countries

**JEL Classification:** F36, G51, I31, J31

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<sup>1</sup> In this research, the stepwise procedure of the estimation was consulted with the Research Economist of the National Bank of Slovakia due to unique nature of databases with imputations. The paper used data from the Household Finance and Consumption Survey provided by the European Central Bank. The data were obtained based on a data provision agreement. European Central Bank is not responsible for the results interpreted in this study. All results are the own calculations of the authors.

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## Introduction

Nowadays, many researchers put their attention on household wealth mainly due to deepening wealth inequality, which is twice as high as income inequality. The significance of studying wealth distribution is growing in developed and developing countries as it is an indicator of social cohesion. Inequality in wealth distribution is usually associated with the intergenerational transmission of poverty. Households accumulate their wealth through various channels, e.g., inheritance, savings, investments, or using loans to accumulate assets. However, most households' wealth consists of real estate, mainly residential real estate. Concerning the real estate market situation, the last global financial crisis in 2008 emphasised the importance of the household sector for the whole economy, especially in view of its excessive indebtedness. Although growing household indebtedness threatens their financial stability and the functioning of the economy, it is one of the possible resources of wealth accumulation.

The possibilities of wealth accumulation and the level of indebtedness growth rate result from historical development and vary across countries due to implemented policies. Households in post-communist countries of Central and Eastern Europe (CEE) participating in the Warsaw Treaty belong to middle-income countries. The difference between income and expenditure is held in the form of savings, but lower income households are much more likely to not have adequate emergency savings and accumulate wealth. Households from the post-communist countries had the opportunity to buy state-owned dwellings for extremely low prices. Later, it led to greater wealth for the next generations in the form of inheritance.

However, homeowners from post-communist countries experience material deprivation and an inability to sustain this source of wealth through proper maintenance and renovation. As a result, housing wealth cannot be seen as an additional source of wealth as in the countries of Western Europe, where it has a long history. Moreover, the indebtedness of households from post-communist countries is still lagging behind households from Western Europe, mainly due to higher homeownership rates due to privatisation.

The aim of the study was to investigate the relationship between household financial vulnerability and household net wealth. The main goal is to highlight the difference between post-communist member states of the European Union (EU) and all other member states with a core in Western Europe. The submitted paper is based on estimating the impact of household debt on wealth. In this context, the following research hypothesis was answered in this study: *Is growing indebtedness a driving force of household net wealth accumulation?*

This paper contributed to the existing literature along the two dimensions. First, micro-level data from the EU Household Finance and Consumption Survey (HFCS) used in this study allowed us to provide a detailed analysis of household financial vulnerability and to assess the level of household net wealth considering the socio-economic and demographic characteristics of households. Secondly, the distribution of the HFCS sample allowed considering the difference in implementing policies that could affect net wealth accumulation and the growth rate of indebtedness. Moreover, using all three waves of the survey carried out so far enabled us to compare wealth and vulnerability and to analyse its long-term development.

## 1. Literature Review

In recent years, studies examining household wealth and indebtedness have increased mainly due to deepening wealth inequality and rising over-indebtedness. Many earlier papers analysed and compared the level of wealth in one country based on the distribution of the population according to different criteria (age, gender, education) (Miller et al., 2017; Lugauer, Ni and Yin, 2019; Oyedepo, Lasabi and Adekanmbi, 2019). Another authors compared the wealth level and distribution in various countries (Cowell, Kargiannaki and McKnight, 2017; Mathä, Porpiglia and Ziegelmeier, 2017). Several studies examined the determinants of wealth in terms of household total assets reduced by the value of debts (Boshara, Emmons and Noeth, 2015; Grejcz and Żółkiewski, 2017; Poterba, Venti and Wise, 2018) and indebtedness from the view of financial planning and non-performing loans (Brounen, Koedijk and Pownall, 2016; Abid and Shafiai, 2018).

The last financial crisis highlighted the importance of monitoring financial vulnerability as a warning factor of the unfavourable financial situation in emerging and advanced economies. Financial vulnerability threatens households' financial stability as they cannot repay secured and unsecured debts and cannot cope with unexpected financial situations. Increasing household debt makes households more vulnerable to potential changes in income, health conditions, or the real estate market. The vulnerability index reflects the vulnerability of households to changes in savings, income expenditures, and loans (Anderloni, Bacchiocchi and Vandone, 2012). Monitoring the financial vulnerability by the vulnerability index captures the macroeconomic, financial and property shocks (Acharya, Bhadury and Surti, 2020; Kuek, Puah and Arip, 2020).

Some financial authorities (Financial Conduct Authority in the United Kingdom and Consumer Financial Protection Bureau in the United States) have collected data about the risk factors characterising financial vulnerability, including

a description of psychological characteristics such as money management skills and financial self-efficacy as principal factors of financial vulnerability (Hoffmann and McNair, 2018).

Nowadays, most households and materialistic individuals with a propensity to risk use debt financing to build and accumulate long-lasting wealth (Flores and Vieira, 2014). A substantial part of the wealth consists of properties financed by mortgages; therefore, there is a question of how debt affects household wealth.

The effect of debt on household wealth depends on the level of indebtedness. Numerous studies examined at which point household debt moved from wealth-building and productive for both households and the economies, to wealth-depleting and destructive. In particular, the likelihood that the household reached this point was based on the share of monthly debt payments on income (Garriga, Ricketts and Schlagenhauf, 2017). Most household debts consist of mortgages collateralised by housing properties, so policy changes increase the financial risk to households. Therefore, while the largest source of collateral for borrowing is used as a tool for wealth accumulation in some households, for others, it means a tool of wealth destruction, mainly through the higher possibility of asset loss and debt delinquency (Bhutta and Keys, 2014).

Additionally, the literature focused on the level and inequality of wealth distribution repetitively proved that household wealth is mainly associated with labour market activities, inheritance, real estate market, and demographic factors. Households accumulate their wealth over the whole life cycle through two major mechanisms: incomes and inter-generational transfers (Boshara, Emmons and Noeth, 2015).

Household income is one of the most considerable factors that stimulate financial vulnerability and net wealth independently of the position in wealth distribution. Household is referred to as financially vulnerable when struggling to cope with unexpected expenditures and repay existing loans (Daud et al., 2018). Mainly low-income households are posed with the risk of financial vulnerability. Households with higher disposable incomes are less likely to experience financial stress (Worthington, 2006). Costa and Farinha (2012) also confirmed that the most vulnerable situations occur in the lowest income class. Moreover, income is intricately linked to household members' employment status, which affects the level of indebtedness. Temporary employment contracts and unemployment increase financial vulnerability, but a stable job increases the likelihood of savings and lowers the financial vulnerability of households (Atalay et al., 2020; Ali, Khan and Ahmad, 2020).

Extensive empirical evidence proved a positive impact of income on wealth. Greater savings allow more significant wealth accumulation (Grejcz and Żółkiewski,

2017; Georgakopoulos, 2019; Giovanis, Ozdamar and Özdaş, 2020). The higher income is not associated with greater wealth only directly. Quantitative skills and patience are crucial factors in financial health, decision-making, and wealth accumulation (Boshara, Emmons and Noeth, 2015). On the contrary, a higher income does not necessarily mean greater wealth. Households with high income could have lower wealth due to their indebtedness and changes in real estate markets, but it is also affected by saving motives and propensities (Cowell, Kargiannaki and McKnight, 2017; Balestra and Tonkin, 2018).

Existing research proves that the level of educational attainment of a reference person is supposed to be stability enhancing factor as well. While higher educational attainment is usually associated with better financial knowledge, the level of educational attainment positively influences the financial stability of households (Anderloni, Bacchiocchi and Vandone, 2012; Brunetti, Gjarda and Torricelli, 2015).

The level and distribution of household wealth reflect the socio-economic and demographic characteristics of the household and household members. Among the most often analysed factors affecting the level of wealth are age, household size, and the number of children living in the household (Humer, Moser and Schnetzer, 2015; Miller et al., 2017; Poterba, Venti and Wise, 2018).

The impact of age on wealth accumulation in the life cycle theory of Modigliani (1986) predicts that young people consume more, while older households prefer to lower their consumption and maintain and accumulate their assets. The theory suggests that older people dispose of greater net worth than younger ones, but it also depends on labour market conditions and debt accumulation (Gibson-Davis and Percheski, 2018; Oyedepo, Lasabi and Adekanmbi, 2019). Households with members younger than 64 display a higher percentage of mortgage loan participation than older ones (Grejcz and Żółkiewski, 2017).

The number of children was found to reduce household wealth (Bannier and Schwarz, 2018), while the lower number of dependent children allows more significant savings (Lugauer, Ni and Yin, 2019). Households with three or more children usually have more assets increasing wealth than households with one or two children.

Moreover, the effect of the number of children also depends on the marital status of their parents. Households with children whose parents are married have higher wealth levels and are more likely to own various assets than other household types (Grinstein-Weiss et al., 2008; Humer, Moser and Schnetzer, 2015). Investigating the association between the number of siblings and the level of household wealth in adulthood showed a negative impact of additional siblings on the wealth of individuals in adulthood (Lersch, 2019).

## 2. Data Sources and Methodology

This study used three waves (2010, 2013 and 2017) of household-level data from the EU Household Finance and Consumption Survey (HFCS). HFCS is coordinated by the European Central Bank (ECB) and collects data on household socio-economic and demographic variables, consumption, finances, and liabilities of all non-institutionalised households. The survey was conducted in waves every three years and covered all the euro area member states. In the first wave (2010), 15 countries and 62,000 households took part, while the second (2013) wave covered 20 countries and 84,600 households. The last (2017) wave consisted of 22 countries and 91,200 households (ECB, 2020a). The year of processing of the HFCS results differs from the reference period of the survey.

To ensure the comparability of the data, the survey was designed as a set of methodological principles. ECB defined core variables that national central banks are reporting to it, but on the other hand, there are non-core variables that countries collected voluntarily as well.

While the imputation process originates from five versions of data, all these versions must be used to estimate the results (ECB, 2016). The HFCS used Bayesian-based multiple imputations to minimise non-response rates, increasing the variability of estimates drawn from the sample. It helped to preserve the characteristics of the distribution.

Moreover, the sample's representativeness for the whole country is ensured by using a set of population weights that considers the household's selection probability, coverage issues, adjustment of weights to external data, and non-response of households (ECB, 2020b). The analysis considered all these specific features of HFCS data (multiple imputations and weights).

Our investigation focused on analysing the relationship between household wealth and financial vulnerability. Hence, the level of household net wealth was defined as a dependent variable, and debt payments represented the household's financial vulnerability compared to income as an explanatory variable (Keese, 2012; Michelangeli and Rampazzi, 2016). Based on the literature review (e.g. Ntsalaze and Ikhide, 2016; Cowell, Kargiannaki and McKnight, 2017; Grejcz and Żółkiewski, 2017; Poterba, Venti and Wise, 2018; Balestra and Tonkin, 2018; Bannier and Schwarz, 2018; Georgakopoulos, 2019; Oyedepo, Lasabi and Adekanmbi, 2019), additional regressors were involved to the estimation. They consist mainly of households' socio-economic and demographic characteristics such as age, employee income, household size, the status of employment, number of dependent children, education, and location. A brief description of each variable was provided (Table 1), as well as a summary of descriptive statistics for the HFCS sample (Table 2).

**Table 1**  
**Variable's Description**

Variable	Description	Unit
Household wealth	Total net wealth of household	1,000 euros
Employee income	Total employee income of all household members	1,000 euros
Age	Age of reference person	Number
Employment status	Employment status of reference person	1: unemployed; 2: employed; 3: self-employed; 4: retired; 5: other.
Number of dependent children	Persons aged 0 – 15 and 16 – 24 living with a parent and not working	Number
Education of reference person	Education of reference person based on ISCED-2011 classification	1: primary education; 2: secondary, upper secondary and post-secondary education; 3: tertiary education; 4: doctoral or equivalent.
Household size	Total number of household members	Number
Financial vulnerability	Share of total monthly debt payments and household gross monthly income (debt service-to-income ratio)	%
Location (dummy variable)	Euro area countries divided into post-communist countries and other countries with a core in the Western EU	1: post-communist EU countries 0: other EU countries

Source: HFCS (ECB, 2010; 2013 and 2017), own processing.

In this research, the quantitative approach based on econometric regression analysis focusing on the relationship between household wealth and financial vulnerability was applied. To avoid the potential endogeneity of the explanatory variable (financial vulnerability), the simultaneous equation model using the two-stage least square method (TSLS or 2SLS) was used. This instrumental estimation technique is preferred to the ordinary least square method (OLS), frequently used in regression analysis made in social sciences (Berry, 1993) when the classical assumption about the repressors' exogeneity might be violated. Then the OLS regression might produce biased parameter estimates (Crosby et al., 2010). Employing the TSLS method and defining instrumental variables helped to avoid the endogeneity problem when variables on the right-hand side of the estimation equation were correlated with the error term. The decision that the OLS estimator is not consistent in our investigation, in favour of the use of the TSLS estimator, was based on the Durbin-Wu-Hausman test for endogeneity (Davidson and MacKinnon, 1993). The null hypothesis that the OLS estimator is consistent (predictors are exogenous, as mentioned by Beckert, 2020) was rejected. Thus, we concluded using the instrumental variables model based on the TSLS method. In all estimations, a financial vulnerability was treated as an endogenous variable. Age of reference person, age of reference person squared, number of children, location, number of household members, and status of employment were treated as exogenous variables. Education and income were treated as instruments. The choice of instruments was influenced by the related



literature (e.g., Daud et al., 2019; Abid and Shaifai, 2018; Terraneo, 2018). Sargan over-identification test served to test the validity of instruments (Null hypothesis: all instruments are valid).

**Table 2**  
**Descriptive Statistics**

Parameter	Minimum	Maximum	Mean	Median	Std. Dev.
HFCS 1 (2010)					
Employee income (1,000 euros)	0.00	2,707.80	36.32	29.28	39.49
Household size	0.00	5.00	0.49	1.00	0.74
Dependent children	0.00	13.00	0.59	1.00	0.97
Age of reference person	17.00	85.00	48.16	48.00	12.96
Employment status	1.00	5.00	1.71	1.00	1.21
Education of reference person	0.00	5.00	3.27	3.00	1.49
Financial vulnerability	0.00	48.42	13.45	11.70	10.86
Net wealth (1,000 euros)	-101.10	667.10	182.53	150.42	163.93
Location	0.00	1.00	0.37	0.00	0.48
HFCS 2 (2013)					
Employee income (1,000 euros)	0.00	908.28	43.01	32.75	37.75
Household size	0.00	7.00	0.98	1.00	0.92
Dependent children	0.00	11.00	0.61	0.00	0.99
Age of reference person	17.00	85.00	48.05	47.00	12.93
Employment status	1.00	5.00	1.80	1.00	1.27
Education of reference person	0.00	5.00	3.21	3.00	1.43
Financial vulnerability	0.00	48.30	13.17	11.30	10.86
Net wealth (1,000 euros)	-414.86	806.29	161.41	104.40	179.32
Location	0.00	1.00	0.35	0.00	0.48
HFCS 3 (2017)					
Employee income (1,000 euros)	0.00	840.50	46.05	35.19	40.95
Household size	0.00	8.00	1.00	1.00	0.94
Dependent children	0.00	12.00	0.57	0.00	0.98
Age of reference person	17.00	85.00	48.68	48.00	12.91
Employment status	1.00	5.00	1.72	1.00	1.22
Education of reference person	1.00	5.00	3.31	3.00	1.40
Financial vulnerability	0.00	44.30	11.99	10.26	9.96
Net wealth (1,000 euros)	-465.38	985.40	189.32	118.43	210.00
Location	0.00	1.00	0.39	0.00	0.49

*Legend:* Dependent variable: wealth; explanatory (endogenous) variable: financial vulnerability; exogenous variables: age of reference person, age of reference person squared, household size, number of dependent children, location; instrumental variables: employee income and education of reference person.

*Source:* HFCS (ECB, 2010; 2013 and 2017), own processing.

### 3. Empirical Findings and Discussion

The household net wealth and debt service-to-income ratio were displayed according to the survey wave (Figure 1 and Figure 2).

Figure 1 displays a variation of household net wealth for households from post-communist countries and all the other EU countries with a core in the Western EU. All three waves indicated significant differences in the wealth distribution

of households from the post-communist countries and the other countries with a core in the Western EU. These findings are consistent with Mathä, Porpiglia, and Ziegelmeyer (2017) and Balestra and Tonkin (2018). According to the latter mentioned, household mean net wealth is lower in countries of post-communistic nature predominantly, while advanced economies achieve higher mean values. Our results showed that in the first wave of the HFCS (2010), a difference in households' net wealth from post-communist and other EU countries with a core in Western Europe was obvious. The median and mean net wealth were lower in households from post-communist countries (median 48,673.69 euros; mean 56,246.65 euros) compared to all the other countries (median 153,772.00 euros; mean 188,148.10 euros)). The interquartile range was more extensive for households from other countries with a core in the Western EU (251,764.20 euros). It indicated greater wealth distribution inequality than households from post-communist countries, which reported a value of 63,362.40 euros. Respectively, the inclusion of additional post-communist countries to the sample reflected in the results. In the second wave, households from the post-communist countries reported a median net wealth equal to 72,344.20 euros, and a mean net wealth of 133,200.90 euros.

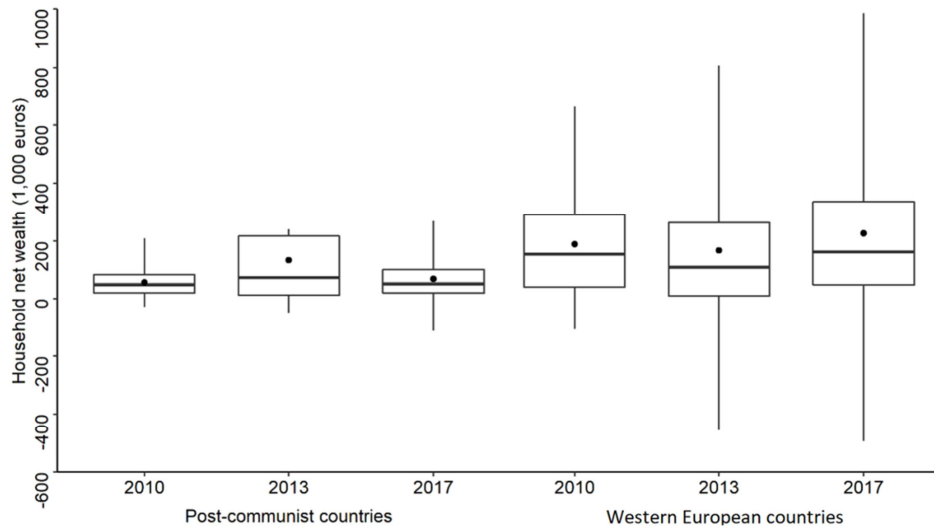
In comparison, the median net wealth of households in other EU countries reached 109,506.30 euros and its mean 166,513.00 euros. Compared to the first wave of the survey (2010), the interquartile range of household net wealth reached 205,430.00 euros in the post-communist countries, while in the other EU countries, it was 254,340.00 euros. In the third wave in the post-communist countries, the median household net wealth decreased to 51,511.61 euros (mean decreased to 67,905.67 euros). On the contrary, in the group of households from all other EU countries with a core in Western Europe, the median net wealth increased to 161,552.5 euros (mean increased to 225,690.30). A lower interquartile range (81,490.00 euros) inducing a lower inequality in wealth distribution is observed in the post-communist countries.

On the other hand, the greater wealth inequality was confirmed in the group of households from all the other EU countries, with the value of an interquartile range of 289,511.11 euros. In all three waves, the expressive occurrence of negative values of net wealth was observed in the case of households located in countries with a core in the Western EU.

Negative values of net wealth signalise the excess of households' liabilities above their assets. According to the research of Balestra and Tonkin (2018), evident negative household equity due to mortgages and real-estate debt was observed in Denmark and the Netherlands.

Figure 1

**Household Net Wealth in Post-communist Countries and Other Countries with a Core in Western Europe in HFCS 1, HFCS 2 and HFCS 3**



Source: HFCS 1, HFCS 2 and HFCS 3 (ECB, 2010; 2013 and 2017), own processing.

Figure 2 displays a variation of household debt service-to-income ratio expressing the financial vulnerability of households from post-communist countries and all the other EU countries with a core in the Western EU. Financial vulnerability of households in post-communist countries (characterised by median, mean and maximum observed) decreased in the monitored period, while in other countries, presented as advanced economies, the persistence of the financial vulnerability might be observed, except for the reduced interquartile range in the third wave. Anderloni, Bacchiocchi and Vandone (2012) mentioned a trend of increasing debt burden when several Italian households faced financial stress after the financial crisis in 2007 – 2008. Later, Brounen, Koedijk and Pownall (2016) described the behaviour of different generations in the Netherlands. They discussed the unwillingness to save; even the government has made reforms to reduce government spending on public goods such as healthcare, education or welfare. Our results showed that in the first wave, the debt service-to-income ratio was lower for households from post-communist countries. However, this group of households suffer from a higher observed maximum.

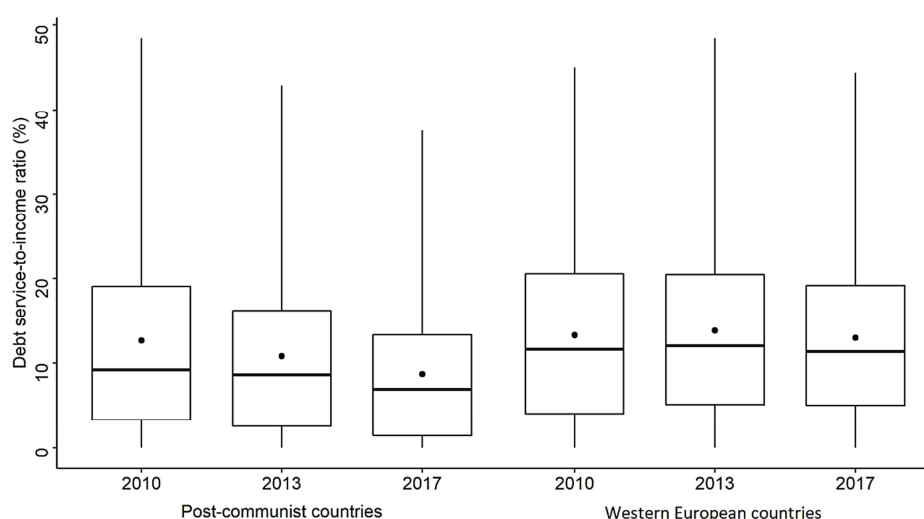
The median debt service-to-income ratio equalled 9.20% (mean 12.67%) in the post-communist countries. In the remaining EU countries, it was 11.58% (mean 13.26%). The maximum debt service-to-income ratio was 48.42% in post-communist countries and 44.90% in other countries. The nature of the debt

service-to-income ratio from the second wave of the survey did not significantly change in the case of other countries with a core in Western Europe. In the post-communist countries, the interquartile range decreased slightly by 2.10%, and the median value declined by 0.60%. The median household debt service-to-income ratio was 8.60% (mean 10.80%) in the post-communist countries, while in all the other EU countries, it was 12.00% (mean 13.78%).

Moreover, the maximum value of debt service-to-income ratio decreased in post-communist countries to 42.90%, but it increased to 48.30% in all other countries. In the third wave of the survey, the decreasing financial vulnerability of households in post-communist countries continues. Their median debt service-to-income ratio is 6.90%, and the mean is 8.68%. Additionally, the maximum level and interquartile range of household debt service-to-income ratio are lower in post-communist countries. While the interquartile household debt service-to-income ratio range is 11.91% in the post-communist countries, for households living in all the other EU countries, the values reached 14.10%.

Figure 2

**Household Debt Service-to-Income Ratio in Post-communist Countries and Other Countries with a Core in Western Europe in HFCS 1, HFCS 2 and HFCS 3**



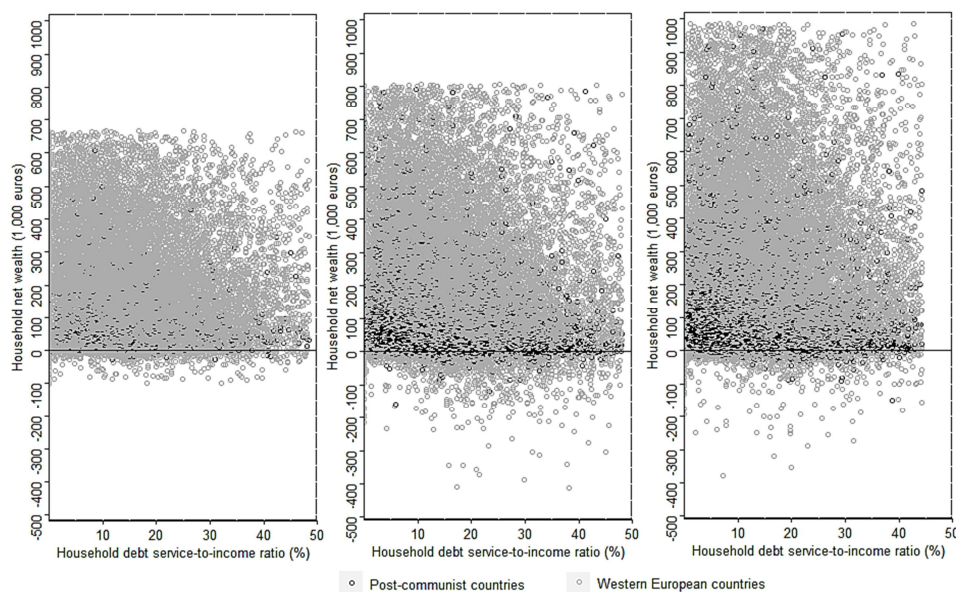
Source: HFCS 1, HFCS 2 and HFCS 3 (ECB, 2010; 2013 and 2017), own processing.

The relationship between household net wealth and debt service-to-income ratio from the first, second and third waves is displayed in the Figure 3. The colour differentiation shows the distribution of the HFCS sample on the households from post-communist countries (darker points) and all the other countries with a core in Western Europe (lighter points). In the first wave, the weaker

abundance of points describing the households from post-communist countries resists the sample size, including households from only three post-communist countries (see Table 4 in Appendix). In the second and third waves, the extension of the sample in question caused an obvious visual effect in Figure 3. While darker points in the first wave seem to be distributed similarly to lighter ones (respectively with lower frequency), in the rest of the waves, their distribution is concentrated closer to zero. It corresponds to projections presented in Figure 1 and Figure 2, where values observed for post-communist countries are lower (median, mean, and interquartile range) compared to the other countries with a core in Western Europe.

Figure 3

**Household Net Wealth (1,000 Euros) and Debt Service-to-Income Ratio (%) in Post-communist Countries and Other Countries with a Core in Western Europe in HFCS 1, HFCS 2 and HFCS 3**



Source: HFCS 1, HFCS 2 and HFCS 3 (ECB, 2010; 2013 and 2017), own processing.

The results of the TSLS regression analysis are presented in Table 3. Obtained results confirmed the statistically significant impact of all considered variables. Increasing vulnerability measured by the debt service-to-income ratio (Keese, 2012; Michelangeli and Rampazzi, 2016) showed the highest positive effect on household wealth during all three reference periods, with its maximum impact in 2010. Although raising household debt threatened the financial stability of households, it helped to ensure and accumulate assets. That means the level of

indebtedness was the driving force for household net wealth. In the European Union, the GDP growth rate has been increasing for most of the analysed period (except 2012). It was associated with raising earnings (Eurostat, 2020). Concerning household debt, economic growth along with rising income supported individuals to apply for a greater loan. Despite the substantial variability in homeownership rates in Europe, a significant part of the household debt is connected to the ownership of the household's primary residence. In terms of homeownership, homeowners are more wealthy than non-homeowners due to saving behaviour changes and accrued capital gains from increased real estate prices. Increased house prices stand for an increase in equity in the household's primary residence and also an increase in net household wealth.

Table 3

## OLS Regression Analysis of HFCS (2010, 2013 and 2017)

Variable	Estimate ( <i>T</i> -statistics)		
	2010	2013	2017
Intercept	406.6948** (2.7700)	767.6428*** (10.5100)	220.3109 (1.2300)
Vulnerability	87.4148*** (5.2700)	77.8478*** (16.0700)	72.6233*** (4.7100)
Location	49.9124 (1.6500)	-62.4157*** (-16.8800)	-48.7089* (-1.0100)
Number of dependent children	-28.4759** (-3.0700)	-48.2183*** (-3.9500)	-83.7408* (-1.3600)
Age of reference person	1.3142 (0.4100)	-26.5186*** (-5.9300)	-48.2026*** (-4.2600)
Age of reference person squared	0.0809 (1.8300)	0.3494*** (6.6600)	0.5999*** (4.1600)
Household members	-5.5741 (-0.6000)	-18.5076** (-2.4500)	-9.7581. (-1.6600)
<i>Employment status</i>			
Employed	9.6410** (3.8300)	8.1488*** (5.5400)	8.7105 (0.4200)
Self-employed	14.84556*** (3.9100)	22.3975*** (5.3700)	38.3767* (2.1700)
Retired	-11.5888** (-2.5500)	-18.0360*** (-6.0100)	-17.4806 (-1.2600)
Other	-7.73038** (-2.1200)	-14.3928** (-3.7700)	-11.0590** (-2.3800)
Durbin-Wu-Hausmann Test p-value	0.0000	0.0000	0.0000
Sargan test p-value	0.0000	0.7030	0.3200
No. of observations	26,053	32,241	36,669

*Legend:* Probability values: ns non-significant; ( $p \leq 0.1$ ); \* ( $p \leq 0.05$ ); \*\* ( $p \leq 0.01$ ); \*\*\* ( $p \leq 0.001$ ). *T*-statistics in parentheses. Dependent variable: wealth; explanatory (endogenous) variable: financial vulnerability; exogenous variables: age of reference person, age of reference person squared, household size, number of dependent children, location; instrumental variables: employee income and education of reference person. Results of the Sargan test indicated that instruments are valid in the 2013 and 2017 waves. Hence we decided to use the majority rule, and we also applied the same instruments in the 2010 wave to ensure the comparability of the estimations' results between waves.

*Source:* HFCS (ECB, 2010; 2013 and 2017), own processing.

Moreover, homeownership contributes to wealth accumulation through inter-generational transfers (Mathä, Porgiglia and Ziegelmeyer, 2017). Financial institutions perceived the ability to repay the debt with increasing income (Handayani, Salamah and Yusacc, 2016). Real estate can be used to back loans or home equity lines of credit, and households with liquidity constraints may use the equity in their mortgages as a source of credit (Vinson, 2018). The changes in the real estate market as the house price per square meter has been increasing during the observed period. Moreover, in the European Union, banks did not provide loans at the price of real estate; they used loan-to-value ratios (LTV) instead. Although the maximum of this ratio is high (in most countries, it was around 85%, in the Netherlands the values reached 100%), the actual level is usually much lower (Barrios et al., 2019). While the debt does not exceed the value of a property and other assets, with the increasing share of debt on income, the household net wealth rose.

The order of other factors that statistically significantly increased the net wealth was represented by the employment status (employed and self-employed), and age of the reference person squared.

Concerning the age of the reference person and the age of the reference person squared, wealth accumulation is associated with the life cycle of household members. Our results are supported by the life-cycle hypothesis that predicts lower consumption and keeping of assets in households with older household members (Modigliani, 1986). Moreover, young households usually set up their households and take mortgage loans, significantly reducing their net wealth (Grejcz and Żółkiewski, 2017). According to other studies, older households are usually risk-averse and have low to no outstanding mortgage balance decreasing household wealth (Vornovitsky, Gottschalck and Smith, 2014; Gibson-Davis and Percheski, 2018; Oyedepo, Lasabi and Adekanmbi, 2019). Although the household wealth trends of younger and older households have diverged in recent years, the mean net wealth growth rate is still higher for a household with older members (Balestra and Tonkin, 2018).

Regarding the number of household members and number of children, there was a negative impact on household wealth. Although authors of some studies (Grinstein-Weiss et al., 2008; Humer, Moser and Schnetzer, 2015; Ntsalaze and Ikhide, 2016) explained that a larger number (3 and more) of older (13 – 17 years old) children increases the household wealth. Our research confirmed the results of studies pointing to the negative impact of a larger number of children on the amount of household wealth (Bannier and Schwarz, 2018; Lugauer, Ni and Yin, 2019). Similarly, according to Van Winkle and Monden (2022), total household net wealth is decreasing with an increasing number of children, and the wealthiest households are childless.

Concerning the geographical location, regression analysis results indicated that households in post-communist countries were less wealthy than in other countries of the euro area after controlling all variables (Mathä, Porpiglia, and Ziegelmeier, 2017). The existing wage gap between post-communist and Western EU countries (Drahokoupil and Piasna, 2018) was associated with lower savings (OECD, 2021), which usually helps to accumulate wealth. Moreover, despite the higher homeownership rate in post-communist countries, the value of wealth consisting of real assets was still lower than in Western Europe (ECB, 2020c).

A stable job increases the propensity to save and build wealth. Our results showed that the employed and self-employed household members showed decrease in household wealth. Households that suffered from negative income shocks or unemployment showed a weaker effect from house price growth (Atalay et al., 2020). In addition to employment status, the field of employment of the household's head and education are also important determinants of financial vulnerability (Ali, Khan and Ahmad, 2020).

Comparison of different employment statuses pointed to a stronger association of financial problems with poor well-being of self-employed compared to employment with wage. In case of financial distress of self-employed workers, the negative consequences for their well-being were more severe. This was typical for the self-employed with and without employees (Berrill et al., 2020). Further research has confirmed that job mobility rate and wages decrease could result in a complex interaction among savings, wages, mobility, and debt. Inability to save and debt obligations restricted moving, contributing to depressed wages (Applegate and Janssen, 2020).

According to existing research, income is one of the most considerable factors influencing financial vulnerability and household wealth. Existing studies explain that increased income, in general, led to greater wealth (Boshara, Emmons and Noeth, 2015; Grejcz and Żółkiewski, 2017; Georgakopoulos, 2019). According to Cowell, Kargiannaki and McKnight (2017), households from top income quintiles were simultaneously at the bottom of wealth distribution. Increasing incomes encourage households to take greater loans, especially mortgages (Khan, Abdullah and Samsudin, 2016) and expose households to the risk of decreasing household wealth through the decline in prices of properties (Wolff, 2017). Households are deemed fragile and financially vulnerable when they cannot pay their basic living needs and repay existing loans. It is typical, mainly for low-income households (Daud et al., 2018). The results of our study are in line with Worthington (2006), Anderloni et al. (2012), and Costa and Farinha (2012), who found that household income significantly affects a household's current financial situation. Households with a higher income run a lower risk of financial distress and are less vulnerable.



The level of educational attainment of a reference person is supposed to be stability enhancing factor, while a higher level of education is usually associated with better financial knowledge, managing financial resources, and better financial decisions (Azzopardi et al., 2019; Noerhidajati, 2020). This is in line with most research papers that examined the socio-economic determinants of household financial vulnerability (Anderloni, Bacchiocchi and Vandone, 2012; Brunetti, Giarda and Torricelli, 2015). The level of educational attainment positively influences the financial situation of households. Members with lower educational attainment do not understand the calculations related to interest rates or inflation, take unnecessary loans and risk financial vulnerability (Yusof, Rohaiza and Jusoh, 2015). Moreover, households with higher educational attainment usually dispose of greater savings than lower educated households, ensuring easier overcoming of unexpected situations (Brounen, Koedijk and Pownall, 2016).

## Conclusions

Since the global financial crisis in 2008, the importance of analysing the household sector has increased mainly due to rising indebtedness. Loans are one of the possibilities for wealth accumulation for households, but they may differ across countries because of different historical development and various implemented policies.

This paper analysed the relationship between household wealth and financial vulnerability using data from the EU Household Finance and Consumption Survey in post-communist countries and all the other countries of the euro area, with a core in Western Europe. Applying TSLS regression revealed that household financial vulnerability was the statistically significant driving force for household wealth measured by the share of wealth on income in all three waves of the HFCS survey. Besides, additional variables reflecting the households' socio-economic and demographic characteristics were involved in the analysis. Debt service-to-income ratio, employment statuses (employed and self-employed), and age of the reference person squared were driving forces of wealth accumulation. In contrast, the age of the reference person, number of dependent children, employment status (retired, other), and geographical location lower the level of household wealth.

Further research on households' wealth and financial vulnerability might be enriched by the results of the newest HFCS wave, which covers data from March 2020 (data are processed, ÖNB, 2022). This wave precedes the full strength of the pandemic crisis. However, it could partly reveal its early effect, which worsened the economic conditions of many households due to implemented preventive arrangements influencing the provision of services and products, and thus employment.

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## Appendix

Table 4

### Countries Taking Part in the HFCS According to the Wave of the Survey

HFCS 1 (2010)	HFCS 2 (2013/2014)	HFCS 3 (2017)
AT, BE, CY, DE, ES, FI, FR, GR, IT, LU, MT, NL, PT, SI, SK	– countries from HFCS 1 + PL, LT, IE, HU, EE	– countries from HFCS 1; and HFCS 2 + HR, LV

Source: HFCS 1, HFCS 2, and HFCS 3 (ECB, 2010; 2013; and 2017), own processing.