EXPLORING DRIVING FORCES OF HOUSEHOLD DEBT IN SLOVAKIA

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Skúmanie stimulov dlhu domácností na Slovensku

***Abstract**: The Slovak household debt has been increasing rapidly over last two decades. Many papers suggest that excessive household debt can present a threat to financial stability and ultimately can have a negative effect on GDP growth in the medium term. Therefore, understanding the determinants of household debt is of great importance to policy makers and supervisors. The goal of this paper is to explore potential driving forces of the Slovak household debt by using quarterly data over the period from 2006 – 2018. We test the impact of nine variables (household deposit growth, interest rate on household loans, unemployment rate, gross disposable income, final consumption of households, inflation rate, GDP growth for Germany, House price index and Economic sentiment indicator) on growth of household credit-to-GDP. Our findings indicate that domestic household consumption, house prices and GDP growth for Germany are significant determinants of household debt in Slovakia.*

***Keywords**: household debt, credit-to-GDP, Slovak banking system*

JEL Classification: G21, R29

1. Introduction

In recent years the debt of the household sector has become the center of attention. Especially, after the global financial crisis, the international organizations and academic researchers started to call attention to the excessive household indebtedness which could pose a risk to the economic growth and financial stability. Policy makers and supervisory authorities have also become more cautious and put this issue on a watch list.

Many countries in Central and Eastern Europe, including Slovakia, have been experiencing a dynamic growth of credit to households over last two decades. This rapid credit expansion can be explained by the catching-up process which has been driven by both macroeconomic and microeconomic factors. Favourable macroeconomic conditions, restructuring of the banking

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sector, privatization, financial liberalisation, development of housing markets and other transition-related factors have promoted lending to both corporate and household sector [6,11]. Although this can be regarded as positive development, which is part of convergence process, there are potential risks coming from an unsustainable rapid household credit growth and over-indebtedness, especially if the loans are denominated in foreign currency.

The Slovak household debt has been increasing quickly over last two decades. It was even rising during the global financial crisis but with a slower pace. It increased from approximately 3.6% in 1999 to 42.2% in 2018. This expansion can be explained by both supply and demand factors. As per the latest Financial Report Stability of the National Bank of Slovakia (NBS) [20], despite the slowdown in retail and household loan growth, both retail loan growth and household indebtedness remain excessive. The NBS has already taken regulatory measures[2] to reduce a rapid pace of household lending, thus limiting a build-up of risk in the banking sector [22]. However, there are still strong factors that promote strong household credit growth, such as low interest rates, favourable labour market conditions or the activity of financial brokers.

Understanding the drivers of household debt is of great importance to policy makers, regulators and also financial institutions. Several empirical research papers provide evidence that highly indebted households tend to be more financially fragile and large household debt can lead to higher insolvencies [2, 5, 15]. Other papers suggest that there is a negative relation between the change in household debt to GDP and subsequent GDP growth. Mian, Sufi and Verner [18] highlight an important role of household debt for business cycles – an increase in the household debt to GDP in the medium run leads to lower GDP growth, higher unemployment and negative growth forecast errors. Other academic studies indicate that rising household debt increases probability of banking crises [1, 9, 10, 16]. Central banks, including the NBS, are also concerned about rising household debt which can pose a threat to financial stability. The International Monetary Fund [13] finds that rising household debt-to-GDP boosts the economic growth and unemployment in the short term but higher household debt growth may have adverse effects and pose risk to macroeconomic and financial stability in the medium term and is also associated with a higher probability of banking crises.

The indebtedness of household could be expressed in different ways. In literature, it has been proxied by the following indicators: total loans granted to household as a percentage of GDP, ratio of the stock of liabilities to income,

[2] The NBS tightened the loan-to-value ratio limits for housing loans, introduced a limit on borrowers' debt-to-income ratio or both housing loans and consumer loans and an indicator of customer repayment ability.

ratio of households' financial liabilities to financial assets and debt service ratio[3]. In this paper we use a commonly used indicator household credit-to-GDP to measure the level of indebtedness of households in Slovakia. The importance of the credit-to-GDP, concretely the credit-to-GDP gap is also highlighted by the Basel Committee on Banking Supervision. As per its guidance [3], it is a key indicator which is supposed to signal a build-up of system-wide risk in the banking sector.

The aim of this paper is to investigate the factors that influence the debt in the Slovak household sector. We estimate the impact of domestic variables and also a foreign variable on the household debt accumulation in Slovakia, using quarterly data ranging from 20062Q until 2018Q4.

We contribute to the literature by studying the impact of macroeconomic, financial and real indicators on the Slovak household debt. Furthermore, in addition to domestic variables, we incorporate a foreign variable, specifically the GDP growth for Germany. Since Slovakia is a small open economy and dependent on foreign markets, particularly on the German demand, the slowdown of the German economy could spark contagion across the EU, including Slovakia. Eventually, this could have an impact on household debt in Slovakia.

The rest of paper is organized as follows. Section 2 provides a brief literature overview on household indebtedness and its determinants. Section 3 describes the data and econometric analysis used in this paper. Section 4 discusses the empirical results. Section 5 concludes this paper.

2. Literature Review

The literature on determinants of household debt study different factors that may affect the household debt accumulation. The factors can be split into following two main factors: demand-side and supply side factors.

On the demand side factors, we can identify factors such as income, wealth, GDP per capita, saving rate, house prices, interest rates, tax system, demography (e.g. life expectancy, age structure of the population). Factors on the supply side affecting indebtedness include institutional characteristics (e.g. quality of bankruptcy law, time to resolve insolvencies, judicial enforcements, collection of information on the creditworthiness of borrowers), credit conditions or banking concentration.

Jacobsen and Naug [14] use an error correction model to study the factors that influence the growth of the Norwegian household debt using quarterly data 1994Q1 to 2004Q1. The debt growth is found to be attributed to rising

[3] Debt service ratio is a flow-type indicator which measures the share of income used for interest payments and amortisations.

house prices, the housing stock and to decline in interest rates since December 2002. Moreover, their results show that an increase in house prices contribute to the household debt growth for a long time.

Barrell et al. [4] examine determinants of household debt-to-income ratio in new EU member states of Central and Eastern Europe. They find that a rise in debt-to-income ratio can be explained by increasing GDP per capita and real house prices and by declining real interest rates.

Turinetti and Zhuang [24] explore factors affecting the US household debt and find that the higher unemployment rate, interest rate, disposable personal income per capita, better education, and the larger share of retiring population are negatively related to the household debt. Stronger consumer confidence and greater share of working age population lead to a rising household borrowing.

Based on cross-analysis for 45 countries, Jappelli, Pagano, and Di Maggio [15] find that institutional factors determine the household debt accumulation, specifically household debt is positively associated with the information sharing register and negatively associated with the length of judicial procedures.

Meniago et al. [19] explore the relationship between the South African household debt and macroeconomic variables using the vector error correction model framework over the period 1985Q1 to 2012Q1. Their results suggest that rising house prices, inflation, GDP, household consumption and savings encourage households to borrow more which ultimately leads to higher debt. Furthermore, they find that when household income and prime rate drop, households tend to get indebted more.

Coletta, De Bonis and Piermattei [7] examine the demand-side and supply-side determinants of household debt, using a sample of 33 countries covering a period from 1995 to 2013. They find out that household indebtedness is related positively to GDP per capita and household wealth. Secondly, the quality of bankruptcy laws seems to be positively correlated with the household debt while a length of time required to resolve insolvencies is negatively associated with the household debt.

In the Slovak context, Messner and Zavadil [27] analyze the determinants of household debt using Slovak data from the Household Finance and Consumption Survey collected in 2010Q4. They estimate a probit model for both mortgage and non-mortgage debt. Their results indicate that household income expectations have a significant impact on the Slovak household debt, both mortgage and non-mortgage debt. Savings, the inheritance of their main residence and the household structure are only related to mortgage debt. The households with a retired reference person are less likely to take out

a loan. Regarding the regional factors, the size of municipality and population density in region have an impact on the volume of mortgage debt while household in more developed regions (with a higher GDP per capita and lower unemployment) tend to be more indebted.

Using a panel of 13 OECD countries for the period 1980-2011, Wildauer and Stockhammer [25] investigate the impact of rising income inequality, rising property prices, low interest rates and credit market deregulation on household debt-to income ratio by estimating an error correction model. Their findings indicate that household debt is primarily result of rising real residential property prices. The second most significant determinant of household debt is low interest rates, following by loose credit market regulation.

Jarmuzek and Rozenov [17] try to identify the main factors of excessive borrowing of households, measured by the gap between actual and sustainable credit-to-GDP ratio. Their results provide evidence that lower interest rates, higher house prices, higher unemployment are associated with excessive leverage of households. They also highlight an important role of institutional factor, specifically rule of law which is positively associated with excessive leverage.

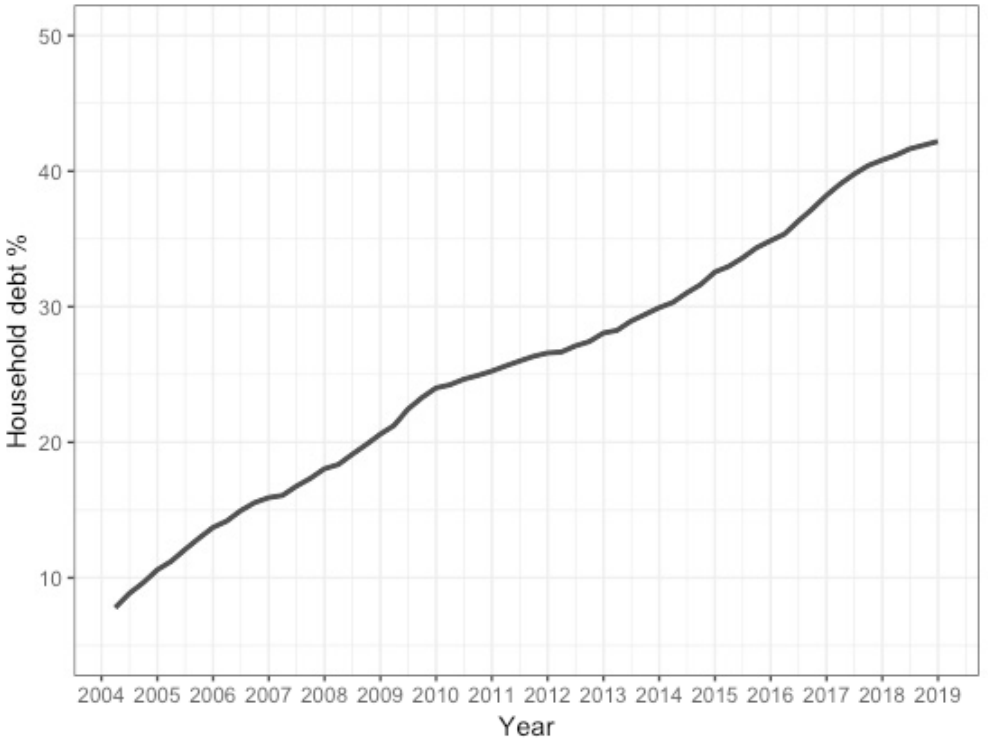
3. Data and Methodology

In this paper we use a quarterly dataset for Slovakia that covers a time period from 2006Q2 to 2018Q4. The sample includes 51 observations. The data is collected from different sources: National Bank of Slovakia, Statistical Office of the Slovak Republic, Eurostat and European Central Bank. We perform an econometric analysis in a software RStudio.

The dependent variable is the Slovak household debt which is proxied by the household credit as a percentage to GDP. As per the Figure 1, we can observe a rising household debt in Slovakia for a period from 2006Q2 to 2018Q4. The Slovak household indebtedness has increased by around 9% annually since 2006. During the pre-crisis period the averaged growth rate reached around 15% per annum while after 2009 the household debt growth has slowed down and since then it has increased by 6.1% annually.

Figure 1

Development of household credit to GDP in Slovakia



Source: author's calculations based on NBS data

Based on the literature review and data availability, we select 9 independent variables which can be split into following three categories:

- Financial indicators: Household deposit growth, Interest rate on household loans
- Macroeconomic indicators: Unemployment rate, Gross disposable income, Final consumption of households, Inflation rate, GDP growth for Germany
- Real indicators: House price index, Economic sentiment indicator

We expect that the household deposit growth leads to lower household debt since households with higher deposits or savings are less like to take out loans. On the other hand, higher deposit growth does not necessarily have an impact on the household mortgage debt because deposits are considered as liquid assets which are not usually able to finance the purchase of house.

A change in lending interest rate has an effect on borrower´s lending capacity, especially if interest rates are variable. When the interest rates rise, borrowers with variable rate loans will face higher debt repayments.

Conversely, lower interest rates enable households to service their debts and make loans more attractive. Moreover, reduction in interest rates stimulates existing borrowers to refinance their mortgage at the lower interest rate [8]. Thus, the interest rate on household loans is supposedly be negatively associated with the household debt.

The household debt is probably sensitive to changes in the labor market. Increasing unemployment rate could imply a decline in the households' income and consumption and thus it is expected to be negatively related to the household indebtedness.

We suppose that household disposable income is inversely associated with household debt. The higher the income, the smaller the amount of debt is needed, and furthermore higher disposable income could improve debt servicing capacity. A drop in income is likely to lead to higher borrowing and household debt.

The relationship between the inflation rate and household debt is not straightforward since inflation has different impacts on borrowers and lenders. In case of borrowers, higher inflation rate reduces the real value of debt so household may be encouraged to borrow more. On the other hand, lenders may become reluctant to lend. If supply side is prevalent, lower inflation will result in higher household debt because lower inflation is associated with lower nominal interest rates which allows household to borrow more.

We also expect that household debt can be driven by higher consumption of household. Debt helps household to smooth consumption of consumer goods when they cannot be financed by the current income. The positive link can be also explained by a life cycle hypothesis which explains the consumption decisions in different stages of a life-cycle. According to this hypothesis, consumption and savings are planned over the life-cycle. At the early stages of the life-cycle households tend to have more debt to meet their consumption. Furthermore, lending can allow households to meet their consumption and investment decisions maintain a stable consumption level [20].

We assume that the development of the household credit-to-GDP is also related to the economic performance of Germany. The Slovak economy significantly relies on the German demand; therefore, this relationship is supposed to be positively correlated. A drop in the German GDP growth could lead to a decline in the Slovak GDP growth which ultimately could have an impact on the household indebtedness. The effect might depend on how fast the credit and GDP decline.

The dynamics of household debt is also related to the development in the real estate market. Increasing house prices are supposed to drive up household borrowing. In developed countries, household loans are significantly related

to the house purchase. Thus, we suppose that house prices influence positively household debt growth.

The Economic Sentiment Indicator (ESI) reflects attitudes and expectations of producers and consumers and provides information on likely future economic development. Higher ESI could mean optimist consumer expectations and confidence in the future which could create a trigger for greater borrowing and therefore a higher household debt.

Table 1 provides information on variable description and data sources and the Table 2 presents a summary of the descriptive statistics for all variables after their transformation.

Table 1

Variable description and source

Variable	Abbreviation	Description	Source
Household debt as a ratio of GDP	HDGG	Quarterly percentage change in loans granted to households and non-profit institutions serving households as a percentage of GDP	European Central Bank
Household deposit growth	HDG	Quarterly percentage change in household deposits	National Bank of Slovakia
Interest rate on household loans	IR	Quarterly percentage change in average interest rate on loans (including loans for house purchase) granted to households	National Bank of Slovakia
Unemployment rate	UR	Quarterly percentage change in unemployment rate (unemployed persons as a percentage of the labour force. Seasonally adjusted data)	Eurostat
Gross disposable income	GDI	The first difference in amount of money that country citizens and companies have available for spending and saving after income taxes have been accounted for.	Statistical Office of the Slovak Republic
Final consumption of households	FC	Quarterly percentage change in amount of household expenditures spent on goods and services.	Statistical Office of the Slovak Republic
Inflation rate	INF	Quarterly percentage change in Harmonized Index of Consumer Prices	National Bank of Slovakia
GDP growth for Germany	GDPG	Quarterly percentage change in GDP for Germany. Seasonally adjusted	Eurostat
House price index	HPI	Quarterly percentage change in all residential properties purchased by households, both new and existing, independently of their final use and their previous owners. Only market prices are considered.	Eurostat
Economic sentiment indicator	EIS	Composite indicator whose goal is to show the current expectations of all participants of economic environment. It consists of 5 sectoral confidence indicators: industrial, construction, trade, services and consumer confidence indicator.	Statistical Office of the Slovak Republic

Table 2

Descriptive Statistics

Variable	Mean	Median	Std. deviation	Minimum	Maximum	Skewness	Kurtosis
HDGG	2.100	1.710	1.170	0.260	5.650	0.860	0.110
HDG	1.950	1.740	2.630	-1.750	17.970	4.400	24.730
IR	-0.020	-0.010	0.060	-0.300	0.120	-1.530	5.910
UR	-1.520	-2.650	4.980	-9.900	14.610	1.570	2.450
GDI	194.080	287.130	1060.420	-2052.250	1992.660	-0.350	-1.000
FC	1.020	1.080	2.350	-5.390	5.320	-0.120	-0.350
INF	155.520	-24.460	968.600	-842.860	6600.000	5.880	36.230
GDPG	0.720	0.880	0.870	-3.680	1.990	-2.880	11.600
HPI	1.080	0.600	3.300	-6.400	8.500	0.230	0.040
EIS	-0.200	0.330	4.290	-13.180	10.030	-0.480	1.550

Source: author's calculations in RStudio

When investigating time series, we need to check if the time series are stationary before running a regression analysis. There are several methods for checking non-stationarity or if a time series variable has a unit root. In this paper, we apply the Kwiatkowski-Philips-Schmidt-Shin (KPPS) test. The KPSS test suggests that the time series are stationary.

Table 3 shows the results of the KPSS testing of each variable.

Table 3

KPSS test – Stationarity test

Variable	p-value	Test statistics	Critical values		
			10%	5%	1%
HDGG	0.078	0.199	0.347	0.463	0.739
HDG	0.100	0.293	0.347	0.463	0.739
IR	0.100	0.087	0.347	0.463	0.739
UR	0.098	0.152	0.347	0.463	0.739
GDI	0.100	0.325	0.347	0.463	0.739
FC	0.100	0.075	0.347	0.463	0.739
INF	0.100	0.137	0.347	0.463	0.739
GDPG	0.100	0.073	0.347	0.463	0.739
HPI	0.100	0.116	0.347	0.463	0.739
EIS	0.100	0.079	0.347	0.463	0.739

Source: author's calculation in RStudio
Notes: The null hypothesis for the test is that the data is stationary.
The alternate hypothesis for the test is that the data is not stationary.
The null hypothesis is rejected if p-value is less than 0.05.

We try to estimate whether the Slovak household debt is driven by various types of variables. To investigate the potential factors of household debt, a basic multivariate regression is estimated in the following form:

$$\Delta\%(HDGG_t) = \alpha + \beta_1.\Delta\%(HDG_{t-1}) + \beta_2.d.\ln(IR_{t-1}) + \beta_3.\Delta\%(UR_{t-1}) + \beta_4.\Delta(GDI_{t-4}) + \beta_5.\Delta\%(FC_{t-4}) + \beta_6.\Delta\%(INF_{t-1}) + \beta_7.\Delta\%(GDPG_{t-2}) + \beta_8.\Delta\%(HPI_{t-1}) + \beta_9.\Delta\%(EIS_{t-1}) + \varepsilon_t \quad (1)$$

with t = 1, 2,…, 52

where

$\Delta\%(HDGG_t)$ denotes the percentage change in household debt growth at a quarter t

α denotes the constant

β denotes the estimated coefficient

$\Delta\%(HDG_{t-1})$ denotesthe percentage change in household deposit growth with one lag

$d.\ln(IR_{t-1})$ denotes the log difference in average interest rate with one lag

$\Delta\%(UR_{t-1})$ denotesthe percentage change in unemployment rate with one lag

$\Delta(GDI_{t-4})$ denotes the first difference in gross disposable income with 4 lags

$\Delta\%(FC_{t-4})$ denotes the percentage change in final household consumption with 4 lags

$\Delta\%(INF_{t-1})$ denotes the percentage change in HICP index with one lag

$\Delta\%\ (GDPG_{t-2})$ denotes the percentage change in GDP growth for Germany with 2 lags

$\Delta\%\ (HPI_{t-1})$ denotes the percentage change in house price index with one lag

(EIS_{t-1}) denotes the percentage change in Economic sentiment indicator with one lag

t denotes the quarter

ε_t denotes the error term

When selecting the appropriate lag length in our time series, we combine both information criteria (Akaike information criterion and Schwarz information criterion) and economic judgement.

4. Results and Discussion

In this section we discuss the results of our econometric analysis. We test five basic assumptions of linear regression in order to validate our results: linearity, normality of residuals, homoscedasticity, absence of autocorrelation and absence of multicollinearity. There is a linear relationship between dependent and independent variables. The residuals follow a normal distribution. Heteroscedasticity is not present in the data which implies that the error terms have constant variance. The autocorrelation test suggests that the residuals are independent from each other. The independent variables are not highly correlated with each other. We also apply Ramsey's RESET test to validate if the functional form of the regression is appropriate.

Our findings suggest that following three explanatory variables are significant and influence the percentage change in household debt in Slovakia: household final consumption, GDP growth for Germany and House price index.

We find out that there seems to be a positive relationship between the final consumption of households and their debt, indicating that rising consumption leads to higher indebtedness of households which is consistent with the results of Meniago et al. [19]. The Slovak households needs to get loans to smooth their rising consumption which could also imply that the Slovak households do not have sufficient financial assets to finance their rising expenditures.

Our findings confirm that the GDP growth for Germany is important for the Slovak households. However, this variable has a negative sign of the coefficient. The negative relationship could be explained by the fact the household debt is expressed by the ratio of credit-to-GDP and the Slovak GDP is significantly linked to the German economic growth. Therefore, when the German GDP grows, the GDP for Slovakia grows as well and it might be increasing faster than the household credit growth.

Furthermore, our regression results show that when there is a rise in house prices, we can expect a rise in household debt in the next quarter. These findings support a large strand of literature that increasing house prices encourage household borrowing [4, 11, 14, 17, 19, 25]. This is also in line with the analytical commentary of NBS published in August 2019 [23] in which rising household indebtedness is one of the reasons for raising the countercyclical capital buffer. The house prices in Slovakia have been increasing on average rapidly than the nominal average wage which makes

buying a house less affordable for workers with average wage. Ultimately, this has been contributed to higher demand for credit, thus increasing the household debt.

The Table 4 shows our results with the estimated coefficients of the independent variables and corresponding standard error. The determination coefficient R^2 indicates that the independent variables explain 49.94% of the variation of our dependent variable – the percent change in household debt.

Table 4

Regression results

	Coefficient		Std. Error
Constant	2.067	***	0.235
Household deposit growth $_{t-2}$	0.078		0.054
Interest rate $_{t-1}$	1.384		2.225
Unemployment rate $_{t-1}$	0.058		0.034
Gross disposable income $_{t-4}$	0.000		0.000
Final consumption of household $_{t-4}$	0.231	*	0.097
Inflation rate $_{t-1}$	0.000		0.000
GDP growth for Germany $_{t-2}$	-0.500	*	0.232
House price index $_{t-1}$	0.104	*	0.049
Economic sentiment indicator $_{t-1}$	-0.014		0.039
R^2	49.94%		
Adjusted R^2	37.43%		
Breusch-Godfrey LM test	0.064		
Breusch-Pagan test	0.081		
Normality of residual	0.614		
Multicollinearity	2.423		
Ramsey's RESET test	0.058		

Source: author's calculation based on NBS data

Notes: The *** denotes significance at 0.1% and the * denotes significance at 1%. We use a 5% significance level for all hypothesis testing. The significance level of 5% is commonly used in the literature.

Breusch-Godfrey LM test for serial autocorrelation of to order 8 with the null hypothesis that there is no autocorrelation. Breusch-Pagan test for heteroskedasticity with the null hypothesis that heteroskedasticity is not present. Shapiro-Wilk's test for normality of residuals with the null hypothesis that the error is normally distributed. VIF>10.0 may indicate a multicollinearity problem. The maximum VIF value in the table.

Ramsey's RESET test for specification with the null hypothesis that specification is adequate.

5. Conclusion and Policy Implications

Household debt which has been rising considerably over the past two decades has raised concerns about its sustainability and its potential risk to financial stability. The Slovak household debt reached 42.19% at the end of 2018 and since the global financial crisis it has increased by 6.1% annually. The IMF suggests that there is a tipping point at which there is maximum positive impact of household debt on GDP per capita growth which is between 36% and 70% of GDP. Moreover, if households are too much indebted, they might be more sensitive and too exposed to adverse shocks or crisis. Thus, understanding the determinants of household debt is important for supervisory authorities and policy makers and could help mitigate its excessive growth.

In this paper we investigate potential drivers of the household debt growth in Slovakia. We use household credit-to-GDP as a proxy for the indebtedness of households. By using quarterly data from 2006Q2 until 2018Q4 we conduct a regression analysis to consider the effects of household deposit growth, interest rate on household loans unemployment rate, gross disposable income, final consumption of households, inflation rate, GDP for Germany, House price index and Economic sentiment indicator.

The results of our econometric analysis indicate that household final consumption, GDP growth for Germany and House price index are significant drivers of household debt in Slovakia. We find out that the final consumption of households and House price index are positively associated with household debt. These results might suggest that the Slovak households do not have sufficient savings or financials assets to finance their rising expenditure or to buy a dwelling without taking a loan. Interestingly, our findings indicate a negative relationship between the GDP growth for Germany and the Slovak households. One of the explanations could be following: the Slovak GDP is significantly linked to the German GDP growth so when the German GDP increases, the Slovak GDP also increases and grows a faster pace than the household debt. A policy implication of this paper could be that when monitoring the household debt growth in Slovakia it is important to follow not only domestic variables but it is also important to take into consideration an external factor, concretely GDP growth for Germany.

We realize that this research has some caveats. Our model is limited to nine explanatory variables. There might be other factors that have not be incorporated in this study and might be significant, such as institutional settings, demographic characteristics or regulations constraints. Since our sample consists of data during the global financial crisis, this might have an impact on results. On the other hand, the Slovak household debt continued to grow during the financial crisis but at a lower rate. Further research could

explore the determinants of household indebtedness at the household level or per type of loans granted to households.

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