BRATISLAVA UNIVERSITY OF ECONOMICS AND BUSINESS

FACULTY OF ECONOMICS AND FINANCE

SELF-REPORT OF DISSERTATION

Mgr. Martin Cesnak

Bratislava 2025

BRATISLAVA UNIVERSITY OF ECONOMICS AND BUSINESS

FACULTY OF ECONOMICS AND FINANCE

Mgr. Martin Cesnak

Self-report of Dissertation

Causes and Consequences of (Over-)indebtedness

to gain the academic degree "Doctor"
("philosophiae doctor", abbr. "PhD.")

in the field of study Economics and Management
in the study programme Finance

Bratislava 2025

The dissertation was elaborated in the internal form of doctoral studies at the Department of Department of Banking and International Finance of the Faculty of Economics and Finance, EUBA

Submitted by: Mgr. Martin Cesnak
Department of Banking and International Finance of the Faculty of Economics and Finance, EUBA

Supervisor: doc. Ing. Andrej Cupak, Ph.D.
Department of Banking and International Finance of the Faculty of Economics and Finance, EUBA

Reviewers: prof. Ing. Martin Lábaj, Ph.D.
The Faculty of Economics and Finance, EUBA

PhDr. Štefan Rychtárik, Ph.D.
National Bank of Slovakia, Bratislava

doc. Ing. Martin Hodula, Ph.D.
Czech National Bank, Praha

The self-report was distributed on August 7th, 2025.

The dissertation defence takes place on August 26th, 2025 at 11:00 o´clock at the Faculty of Economics and Finance, EUBA, Dolnozemská cesta 1, 852 35 Bratislava, before the dissertation defence committee in the doctoral study programme Finance, field of study Economics and Management, appointed by the Dean of the Faculty of Economics and Finance, EUBA.

doc. Ing. Jana Péliová, PhD.
chairwoman of the Doctoral Study
Subcommittee 1.2 Finance

1 An Overview of the current status of the issues addressed in the dissertation at home and abroad

Household indebtedness has emerged as a defining feature of advanced economies, driven by liberalized access to credit and shaped by a mix of individual behaviors, institutional practices, and macroeconomic dynamics. While debt can facilitate consumption smoothing and wealth accumulation in line with the life-cycle hypothesis (LCH), it can also become a source of vulnerability when households borrow excessively or face adverse shocks.

The life-cycle hypothesis (Modigliani, 1954) posits that individuals borrow when young, save during peak earning years, and dissave during retirement to maintain stable consumption. Debt in this context is a rational tool. However, deviations occur due to limited financial literacy, behavioral biases, and overly favorable credit conditions. Research (e.g., Lusardi and Tufano, 2015; Tseng and Hsiao, 2022) consistently finds that households with low financial literacy are more susceptible to costly debt and financial distress, especially during economic shocks like the COVID-19 pandemic.

The macroeconomic dimension of household debt is captured in Minsky's Financial Instability Hypothesis (Minsky, 1976; Minsky, 1986), which suggests that prolonged periods of economic stability and rising asset prices encourage excessive borrowing and risk-taking. This dynamic often leads to systemic financial fragility. Empirical evidence supports this theory, linking excessive household debt to factors like low interest rates, rising home prices, and optimistic expectations (e.g., Jarmuzek and Rozenov, 2019; Bover et al., 2018).

Excessive debt poses financial risks, particularly credit risk. Research shows that arrears and defaults are often tied to affordability issues such as unemployment, high mortgage payments, and low disposable income. Country-specific studies across Europe (see e.g., Aristei and Gallo, 2016; Aller and Grant, 2018; Kelly and O'Toole, 2018) confirm the importance

of socio-demographic and macroeconomic factors in explaining default risks.

The 2008 global financial crisis underscores these risks. As Minsky predicted, household overleveraging—especially through subprime mortgages—contributed significantly to the collapse (Rajan, 2011; Mian and Sufi, 2009). Credit booms remain one of the most consistent predictors of financial instability (Borio and Drehmann, 2009; Jordà et al., 2021).

To mitigate these systemic risks, borrower-based measures (BBMs) have become key regulatory tools. Instruments like Debt-to-Income (DTI), Debt-Service-to-Income (DSTI), and Loan-to-Value (LTV) ratios help limit risky lending, especially during credit expansions. Research suggests these tools are most effective when implemented in combination, enhancing their ability to reduce systemic vulnerability (Cassidy and Hallissey, 2016; Jurča et al., 2020).

The COVID-19 pandemic tested the resilience of indebted households and the effectiveness of BBMs. Higher DTI and DSTI ratios were associated with a greater likelihood of seeking loan deferrals, showing the critical importance of regulating debt burdens during times of crisis (NBS, 2020; Allinger and Beckmann, 2021).

Excessive debt affects more than just financial metrics—it has profound psychological and social consequences. Research links over-indebtedness with increased stress, anxiety, and depression (Brown et al., 2005; Keese, 2012), impacting life satisfaction, productivity, and family relationships. Thus, indebtedness should also be treated as a public health and social issue, warranting supportive policies such as financial counseling and mental health services.

2 Aim and focus of the dissertation

This thesis examines the causes and consequences of household (over-)indebtedness through the lens of three empirical essays. Each essay explores a different dimension of household borrowing behavior in

Slovakia, a country that has experienced one of the fastest increases in household indebtedness (in terms of debt-to-GDP) among Central and Eastern European countries in recent years.

2.1 The impact of macroprudential policy and mortgage market characteristics on household indebtedness

The first essay examines the differential impacts of BBMs on mortgage loans, leveraging a unique and comprehensive dataset from Slovakia — a country characterized by recent, targeted policy interventions and a distinctive market structure. The role of financial advisors is a central focus, as advisors significantly influence loan contract terms, particularly in markets where consumers lack financial sophistication. Advisor-mediated loans often involve larger amounts with higher LTV and DTI ratios, potentially amplifying risks despite regulatory caps. Analyzing the role of advisors provides critical insights into how macroprudential policies affect risk profiles differently. This understanding is essential for determining whether advisors' influence undermines or complements macroprudential policy objectives, enabling more effective systemic risk mitigation. Ignoring the advisor dimension would risk overlooking these heterogeneous effects and could misguide policy design intended to promote financial stability.

This essay offers a comprehensive evaluation of the effects of financial advice on mortgage outcomes, clearly distinguishing between advised and direct loan procurements. It advances the understanding of policy impacts across the full spectrum of loan distributions, specifically investigating effects both above and below the policy-imposed thresholds.

2.2 Effect of indebtedness on household life satisfaction

The second essay uses survey data to assess how debt affects well-being. The aim of this essay is to analyze the impact of indebtedness on the life satisfaction of Slovak households from various perspectives.

The analysis is based on the conceptual model of Kamleitner and Kirchler (2007) and its extended version by Bialowolski and Weziak-Bialowolska (2021), which describes the process of satisfying needs through the use of credit. This model connects credit use with multiple household decisions:

1. Type of goods and credit: We compare life satisfaction between indebted and non-indebted households, distinguishing among debt types (e.g., housing vs. other loans).

2. Financing method: We examine differences in satisfaction between outright homeowners and those financing their homes with a mortgage, despite pursuing the same goal—homeownership.

3. Credit approval: We explore the impact of loan approval versus credit denial, emphasizing credit availability as a relatively under-researched factor affecting well-being.

4. Debt burden intensity: Instead of using arrears or defaults, we apply a continuous, objective measure—monthly debt repayments as a share of household income—to better capture the real burden of debt on life satisfaction.

5. Repayment behavior: While often used as a proxy for debt burden, we treat repayment issues as outcomes rather than causes. Due to data limitations, this dimension is not further analyzed, though it is well covered in existing literature.

All these channels or dimensions influence each other according to the mechanisms described above, and the resulting level of satisfaction depends on their combined effect. The overall impact of indebtedness on life satisfaction also depends on the stage of the loan life cycle. In the initial phase, the most pronounced positive effect may be linked to the purchase (e.g., housing). Over time, as households begin to repay the debt, this initial benefit may diminish due to the financial burden of the debt. In later stages, the perception of debt may change due to various factors such as changes in interest rates or unexpected income and

expenditure shocks. These changes may disrupt regular repayments and lead to fluctuations in life satisfaction.

2.3 Vulnerability of indebted households during Covid-19 pandemic

In the last essay, we focus on the possible financial stability implications of the loan payment deferral which allowed Slovak indebted households to postpone the payment of their monthly loan installments during Covid-19 pandemic.[1] Some form of a loan payment moratorium was one of the most widespread Covid measures. According to the policy tracker provided by the International Monetary Fund, around two thirds of countries introduced such a deferral. 44% of countries implemented it in national legislation. The most frequently used span for the payment moratorium was 3, 6 or 9 months. The impact of this measure on households' credit risk is particularly important for countries such as Slovakia, where loans to households represent almost 45% and loans to non-financial corporations (NFCs) almost 22% of banks' total assets. Moreover, Slovakia had been among the countries with the fastest increase in household indebtedness in the years preceding the crisis. At the outbreak of the pandemic, household indebtedness (in terms of debt-to-GDP) was among the highest compared to other Central and Eastern European countries.

The deferral is unique as it makes banks and supervisors "blind" in the sense they have no information about the development of the debtor's financial situation during the moratorium and about the debtor's ability to repay its loans after the moratorium ends.[2] Under any other measure,

[1] Households were able to defer loan payments for 6-9 months. Virtually all households were able to apply for the deferral, only households already in arrears were refused.

[2] Loan payment deferral and other forms of forbearance are generally part of the banks' toolkit that debtors under financial stress can use to avoid default. However, during Covid-19 pandemic, this measure was introduced by the government in a uniform manner and debtors who asked for it were not flagged by the banks. This means that indebted households could use this measure without any impact on their future credit rating.

debtors are obliged to pay their monthly installments regularly, so banks have direct information on whether they can service their debt. Therefore, while this measure helped debtors under stress, it may have masked the financial stability implications of the pandemic by postponing the materialization of household credit risk.

3 Methodology of work and research methods

In all three essays, it is essential to utilize a variety of data sources alongside various empirical estimation approaches. This combination ensures a robust analysis by drawing on diverse information and applying statistical methods to estimate relationships or effects accurately.

3.1 The role of financial advisors and macroprudential policy in mortgage market risk

In the first essay, we leverage a comprehensive dataset comprising the universe of mortgage loans in Slovakia (loan tapes), including both loans granted directly (non-mediated) and those facilitated by advisors (mediated). The loan register data span quarterly reports from 2018Q2 onward, encompassing all active loans at the time of each report. However, loans granted before 2018Q2 are included only if they were not yet repaid as of that quarter. Our focus is on newly granted mortgage loans[3] between 2013Q1 and 2022Q4, enabling us to explore differences between loans mediated by financial advisors and those that are not.[4] While the dataset includes a time dimension, each loan appears only once in our sample at the time of granting, resulting in repeated cross-sectional data.

First, we run the following standard regression to estimate the effect of advisors, the policy and their interaction (to cover different policy effects on risk measures for mediated loans):

[3] We focus exclusively on pure new loans collateralized by real estate. Refinancing loans or renegotiated loans are excluded from our sample.
[4] It is important to note that as we examine earlier periods, the number of loans diminishes due to repayments or refinancing.

$$Y_{i,t} = \beta_0 + \beta_1 Advisor_{i,t} + \beta_2 BBM_t + \beta_3 \left(Advisor_{i,t} \times BBM_t\right) + \beta_4 X_{i,t} + \beta_5 Z_{i,t} + \beta_6 \lambda_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $Y_{i,t}$ captures respective parameters of the i-th individual loan (granted amount, maturity, LTV, DTI, DSTI) granted at time t, $Advisor_{i,t}$ indicates whether the i-th individual loan was mediated through financial advisor in time t. We work with two versions of BBM_t variable. The first version is a dummy variable indicating whether the loan was granted after the policy announcement and thus captures the total effect of the policy, starting immediately after the announcement. The second version is a multinomial variable determining different periods related to the policy implementation: period before the announcement, period between the announcement and implementation, phase-in period and period after the full implementation. This version allows us to examine the different effects of the policy at different stages of its implementation. Besides these covariates of interest, we also include a set of loan parameters ($X_{i,t}$), borrower characteristics ($Z_{i,t}$) as well as bank, region, quarter and month of year fixed effects ($\lambda_{i,t}$) to control for borrower preferences and mortgage market characteristics.[5] Standard errors are clustered at the bank level to account for intra-group correlation, enhancing the robustness of our inference.

Our estimation approach is based on the assumption that the loans granted after the policy announcement would have been - without the announcement and/or policy taking place - distributed equally as loans granted in the period before the announcement. In other words, we use the pre-announcement loan distribution as the counterfactual distribution for estimating policy effects in post-announcement periods.

Next, we examine the effects of policy and financial advice (as well as their interactions) on different parts of the distribution of the respective outcome variables. To do so, we use unconditional quantile regressions

[5] We include income and collateral value in logs, financial assets ihs transformed and squared term of age variable into the model.

(UQR), which are based on the concept of recentered influence functions (RIF) – a widely used tool in robust estimation.

Once the RIF of the unconditional quantile (τ) of the outcome variable is obtained, the UQR can generally be estimated within a simple OLS framework as follows:

$$RIF(Y, Q_\tau(.), F_Y) = \beta_0(\tau) + \beta_X(\tau)X + \varepsilon, \quad (2)$$

with τ taking quantile values from a range of 0.05-0.95.

The UQR thus marginalizes the effect of the variables of interest (mediated vs non-mediated loans and the policy change) over all other control variables included in the model. In terms of inference, bootstrap standard errors are estimated by drawing 1,000 random samples with replacement from the original sample.

We acknowledge that any causal claims are contingent upon the assumption that selection bias can be adequately addressed through observable variables. We have implemented a comprehensive strategy that integrates both, flexible parametric and non-parametric functional forms, to minimize the emergence of such bias where possible. We carry out the two-stage regression procedure, also known as "doubly robust approach". In the first stage, the covariates are balanced between mediated and non-mediated loans and similarly between loans granted before and after the policy announcement or among loans granted in different stages of the policy implementation using the inverse probability of treatment weighting (IPTW) technique.[6] In the second stage, the OLS regression (1) is estimated using the weighted sample obtained in the first stage. We measure the similarities among

[6] See, e.g., Austin and Stuart (2015) for practical guidance in application of IPTW.

observations using propensity scores estimated with machine learning algorithm – Generalized Boosted Models.[7]

3.2 The effect of debt on household life satisfaction

In the second essay, we utilize recent microdata from the last two waves (2017 and 2021) of the Household Finance and Consumption Survey (HFCS) from Slovakia. The database contains very detailed information on asset and liability holdings at the household and individual level. It also includes detailed information on several financial and socio-demographic characteristics, such as income or employment status, household structure, age, gender, education, and marital status of the household representative. The database also contains several psychological, cognitive and behavioral factors. Most importantly, representative individuals rate their overall life satisfaction on a scale from 0 (the lowest life satisfaction) to 10 (the highest life satisfaction), which we use as a proxy for subjective well-being.

We explore the relationship between individual SWB and household indebtedness vis-a-vis various socio-economic determinants by OLS regressions. Although our outcome variable is measured on a discrete ordinal scale, we treat it as a continuous variable as common in the literature. To ensure the reliability of our inferences, we estimate all regressions using robust (heteroskedasticity-consistent) standard errors to determine 95% confidence intervals. Furthermore, it should be noted that all estimated regressions take into account survey weights to ensure representativeness (in line with the ECB HFCS guideline). Selection bias is addressed via propensity score weighting procedure, using probit regression to estimate propensity scores, calculating weights in ATET design and combining them with survey weights as proposed by Ridgeway et al. (2015).

[7] See McCaffrey et al. (2004) for more details on the empirical application of generalized boosted models in propensity score estimation, and McCaffrey (2013) for their application in a multiple treatment setup.

First, we estimate the effect of debt holding on SWB using the following OLS regression:

$$SWB_i = \beta_0 + \beta_1 D_i + \beta_2 Year_i^{2021} + \beta_3 (D_i \times Year_i^{2021}) + \beta_4 X_i + \varepsilon_i, \quad (3)$$

where SWB_i is the subjective well-being (life satisfaction score) of the i-th household, D_i is the dummy variable taking value of 1 indicating whether the i-th household has a debt. In some specifications we also distinguish between mortgage and non-mortgage types of debt, which allows us to examine the impact of different debt products. $Year_i^{2021}$ (=1 if i-th observation is measured in HFCS 2021 wave) captures year fixed effects, and thus controlling for changes in overall economic and social conditions that might cause an overall shift in life satisfaction between the survey waves. Importantly, the interaction term $D_i \times Year_i^{2021}$ captures the change in households' perception of debt between the survey waves. X_i is a set of financial and socio-demographic characteristics, including all available determinants of perceived quality of life (net wealth, net income, age, gender, education, employment status, marital status, household size, presence of children in household, degree of urbanization).[8]

We also shed light on credit access channel. We analyze if being refused or having a reduced credit limit had an impact on the perceived life satisfaction of households that have applied for credit within the last three years. Again, using regression model (3), we estimate the effect of being credit constrained in general, as well as the effect of credit refusal and credit reduction separately.

Finally, for those households, who possess any type of debt, we estimate the effect of debt burden (intensity) on SWB by the following OLS regression:

[8] We normalize variables that show increasing trends over time (net income and net wealth) by dividing each value by the mean value of a given year. We include normalized net income in logs, normalized net assets ihs transformed and squared term of age variable into the model.

$$SWB_i = \beta_0 + \beta_1 DSTI_i + \beta_2 X_i + \varepsilon_i. \quad (4)$$

Again, the notation remains the same as in regression (3) except $DSTI_i$, which represents the debt service-to-income ratio measured in the context of the NBS framework, i.e., as a fraction of total monthly installments and total monthly net income subtracted by household subsistence minimum. The value of subsistence minimum is calculated based on the structure of the household and the applicable legislative framework at the time. It approximates the amount of money needed for the basic needs of a given household.

The higher the debt burden, the higher the DSTI indicator. If the household income is not sufficient to cover the monthly instalments, the value of the DSTI is greater than 1. However, if the household income is not sufficient to cover even basic needs, the DSTI reaches a negative value. To deal with the discontinuity and the non-intuitive order of the values, we discretize our main explanatory variable – household-level DSTI – to the following 5 categories (0%–30%; 30%–60%; 60%–100%, >100%; <0%). Treating the DSTI variable as categorical may be more appropriate, particularly for the matter of interpretation.

3.3 Resilience of indebted households during Covid-19 pandemic

In the third essay, we utilize a multi-wave survey of indebted households during Covid-19 pandemic. In order collect the necessary information during the moratorium, the National Bank of Slovakia conducted a multi-wave survey among indebted households. The survey focused on the development of their financial situation and their expectations regarding loan repayments after the end of the moratorium in 2021. The survey had a monthly frequency, with approximately 1,000 indebted households being examined from July until December 2020. The sample was representative of the total population of the Slovak indebted households. The survey collected information at both household and individual level, designed to capture the impact of the Covid-19 pandemic on the households' economic and financial situation and their future economic expectations. It also collected detailed information on standard socio-

demographic characteristics such as age, gender, education, household composition and so on.

We start by estimating a cross-sectional probit regression[9] of determinants of opting for a loan payment deferral[10]. The estimation equation takes the following form:

$$Pr(Y = 1|X) = \Phi(\alpha + \beta X + \gamma Z + \delta) \quad (5)$$

where Y is a binary outcome variable taking a value of 1 if the household opted for a deferral, and 0 otherwise. X is a set of explanatory variables including the change in income levels due to the crisis, any change in income conditions of economically active household members – either employed or self-employed[11], pre-crisis DSTI ratio or the change in the DSTI since the onset of the crisis[12]. Φ is the standard CDF. We also control for a set of variables captured by Z such as education, age, gender, as well as regional and bank fixed effects, δ.

We estimate the probability of opting for a loan repayment deferral only based on the first wave of the survey. More than 80% of all the deferrals took place during the first lockdown between March and June 2020. As we aim to explain the factors leading households to ask for a deferral, we need to relate their decision to their financial situation the closest to the decision, which is in our case the July wave of the survey. During that period, still a lot of households were under financial stress. During the later waves the flow of new deferrals was minimal, and the financial situation of households might have improved. Therefore,

[9] In principle logit regression techniques, such as the one developed by Firth (1993), to analyse rare events would be more applicable. However, in our case of having intentional overrepresentation of the rare events in the survey, and application of the standard probit regression considering the survey weights is sufficient.

[10] As loan payment deferral is applicable only in case a household has at least one loan, our population contains all indebted households. While the selection process was not completely random, we use weighted estimations to match the true distribution of indebted households as much as possible.

[11] No change, one partner lost his/her job or has reduced working hours, or all partners lost their jobs or reduced working hours.

[12] The change in the DSTI is only a theoretical value and is calculated based on the change in income. The loan payment deferral is not taken into account.

estimating the probability of asking for deferral based on the later rounds could lead to biased results.

An important information in the survey is the expectations of indebted households opting for the deferral regarding the ability to repay their debts after the end of moratoria, i.e., in 2021. To empirically study the main determinants of the future household expectations among households under moratoria regarding their ability to start repaying the loans, we estimate the probit regression (5), where the notation remains the same, except Y being a dummy variable taking values of 1 if the household expects that it will not be able to pay back its liabilities, and 0 otherwise. Again, income change and the pre-crisis DSTI are strong candidates for driving the expectations. Unfortunately, the estimation of expectations using a panel regression framework is not possible due to the small number of observations of households with negative expectations included in several consecutive waves. Therefore, the analysis in this part is again based on the weighted cross-sectional data.

4 Structure of the dissertation

The initial section serves as a general introduction to the topic, establishing a theoretical framework for examining the causes and consequences of household (over-)indebtedness. It begins by outlining foundational models developed by Modigliani and Minsky, which provide key insights into household borrowing behavior and financial fragility. This theoretical base is then expanded through an extensive review of empirical studies that both validate these models and explore household indebtedness from multiple angles. These perspectives include its impact on financial stability, personal financial wellbeing, the broader economy, as well as social and psychological dimensions. By integrating these diverse strands of research, the section offers a comprehensive understanding of the complex drivers and outcomes associated with household debt.

The following section presents the first essay, which investigates the varied effects of macroprudential policy tightening on mortgage lending,

utilizing a unique and detailed dataset from Slovakia. A key emphasis is placed on the role of financial advisors, who play a crucial part in shaping loan contract terms, especially in contexts where borrowers have limited financial literacy. Drawing on a comprehensive loan-level database, the analysis applies both linear and quantile regression techniques to capture average effects as well as impacts across different points in the distribution of outcome variables. To address potential biases arising from sample selection, a doubly robust methodology is implemented, incorporating propensity score weighting based on generalized boosted models.

Next section presents the second essay, which utilizes survey data to evaluate the effects of debt on household well-being, focusing on how indebtedness influences life satisfaction among Slovak households from multiple perspectives. The analysis is grounded in the conceptual framework, which conceptualizes the process of fulfilling needs through credit use. This model links credit consumption with various household decisions, providing a comprehensive lens to understand the interplay between debt and well-being.

Next section presents the last essay, which examines the potential financial stability implications of loan payment deferrals granted to Slovak households, which allowed borrowers to postpone monthly loan installments during the COVID-19 pandemic. Employing probit regression models, the analysis estimates the likelihood of households opting for payment deferral or harboring negative future financial expectations. This approach helps identify the most vulnerable and financially fragile indebted households throughout the pandemic period.

The final section provides a comprehensive summary of the thesis, synthesizing the main findings and discussing their implications. It also critically reflects on potential limitations and weaknesses in the analysis, acknowledging areas where the research may fall short. Finally, the section outlines directions for future research, suggesting opportunities to build upon the current work and address unresolved questions.

5 The results of the work

Each of the three essays constitutes an individual research article, currently at various stages of the publication process. This section provides a summary of the findings from all three articles. Specifically, this section includes these articles:

- **Causes of Household Risky Mortgage Behavior in Slovakia: The Role of Financial Advisors, Household Characteristics and Macroprudential Policy**
  Co-authored with: Andrej Cupak (NBS, EUBA), Pirmin Fessler (OeNB), Jan Klacso (NBS)
  Current state: Under review in the Journal of Financial Intermediation.
  Other versions of this paper have been published as an Austrian Central Bank working paper (WP 263) and a National Bank of Slovakia working paper (WP 3/2025).

- **Opportunity Taken, Opportunity Missed: Household Debt and Subjective Well-being in Slovakia**
  Co-authored with: Andrej Cupak (NBS, EUBA)
  Current state: Yet-to-be-submitted

- **The Impact of Loan Payment Deferral on Indebted Households and Financial Stability during the Covid-19 Pandemic: Survey Results from Slovakia**
  Co-authored with: Andrej Cupak (NBS, EUBA), Jan Klacso (NBS), Martin Šuster (Council for Budget Responsibility)
  Current state: Published in Czech Journal of Economics and Finance, 2023, vol. 73(3), pp. 220–250. DOI: https://doi.org/10.32065/CJEF.2023.03.01.

5.1 Causes of Household Risky Mortgage Behavior in Slovakia: The Role of Financial Advisors, Household Characteristics and Macroprudential Policy

Table 1 provides the estimated coefficients of the regression model examining the impact of the financial advisors (mediated vs. non-

mediated loans dummy) on granted amounts, LTV, DTI and DSTI ratios, and loan maturity. These effects are estimated for the full sample (2013Q1 – 2022Q4), controlling for a large number of borrower- and mortgage market-based covariates. Results confirm that the volume of loans granted via financial advisors is significantly different in nominal terms as well as relative to income or collateral. Mediated loans are in general larger by approximately 16% of volume, 4 p.p. of LTV and almost 40% of the borrowers' annual net income. Interestingly, mediated loans differ only slightly from non-mediated loans in terms of debt service burden. This is because mediated loans are on average granted with a longer maturity of around 1.8 years, which allows borrowers to take on more debt for the same amount of monthly repayments.

Table 1: Effects of financial advisors on selected loan outcomes

	Log of granted amount	**LTV**	**DTI**	**DSTI**	**Loan maturity**
	(1)	(2)	(3)	(4)	(5)
Advisor	0.157***	0.040***	0.386***	0.004*	1.774***
	(0.018)	(0.004)	(0.029)	(0.002)	(0.125)
Loan parameters	Yes	Yes	Yes	Yes	Yes
Borrower characteristics	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes
Month of year FE	No	No	No	No	No
Subsample	full	full	full	full	full
Observations	356,823	356,706	342,659	356,452	347,551
Adjuster R^2	0.614	0.257	0.521	0.410	0.557

Notes: Full estimation sample period is 2013Q1—2022Q4. Clustered standard errors at the bank level are reported in parentheses. * p<0.1, ** p<0.05. *** p<0.01.
Source: National Bank of Slovakia.

Table 2 extends the results above by including the impact of the policy and is interaction with advisors. We split the policy variable into the different stages of the policy implementation: the announcement period, the phase-in period, and the period after full implementation. The effects of these stages are estimated with relation to the pre-announcement

period and thus cannot be interpreted as additive. In this case the samples are restricted to shorter periods, starting 2 quarters before the announcement and ending 2 quarters after the full implementation of the policy. We exclude quarter fixed effects from the specification due to the strong collinearity with policy variable and replace it with month of year fixed effect to control for time varying characteristics of the mortgage market. As the policy was aimed to curb the rapid growth of household debt through LTV and DTI limits, we focus on volume-based loan outcomes.

We observe a significant impact of the policy on loan amounts, LTV and DTI even before the policy was implemented. LTV increased by almost 3 p.p., DTI by more than a third of borrowers' annual net income and loan amounts increased by more than 5% during the announcement period. Interestingly, the amounts increased by an additional 3.5% if mediated by advisors. These results could be explained by agents (borrowers, banks, advisors), realizing the restrictiveness of the policy, taking the advantage of the last possible moments of relaxed conditions before the policy becomes binding. Surprisingly, after the policy was implemented the values of loan outcomes returned to their original levels, represented by insignificant coefficients for phase-in and full implementation. However, this does not mean that the implementation of the policy has no impact on considered loan outcomes. The overall weak impact of the policy can reflect the negative impact on the distribution above the BBM limits and the potentially positive impact on the distribution below the BBM limit. As expected, mediated loans were more restricted, in terms of LTV (by almost -2 p.p.) and DTI (by almost -0.25), compared to non-mediated loans, after the policy was fully implemented, as these loans had higher values of LTV and DTI already before the policy.

Table 2: Effects of advisors and policy on selected loan outcomes

	Log of granted amount	**LTV**	**DTI**
	(1)	(2)	(3)
Advisor	0.143***	0.046***	0.539***
	(0.021)	(0.005)	(0.104)
Announcement	0.053***	0.029***	0.358**
	(0.015)	(0.005)	(0.173)
Phase-in	0.002	0.012	0.234*
	(0.039)	(0.012)	(0.141)
Full implementation	0.022	0.022	0.247*
	(0.062)	(0.020)	(0.126)
Advisor × Announcement	0.035**	0.006	-0.063
	(0.014)	(0.004)	(0.108)
Advisor × Phase-in	0.034*	-0.006	-0.147
	(0.018)	(0.007)	(0.109)
Advisor × Full implementation	0.009	-0.017**	-0.245**
	(0.026)	(0.008)	(0.099)
Loan parameters	Yes	Yes	Yes
Borrower characteristics	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Quarter FE	No	No	No
Month of year FE	Yes	Yes	Yes
Subsample	$+/-2Q$	$+/-2Q$	$+/-2Q$
Observations	101,697	101,621	96,099
Adjuster R^2	0.595	0.240	0.530

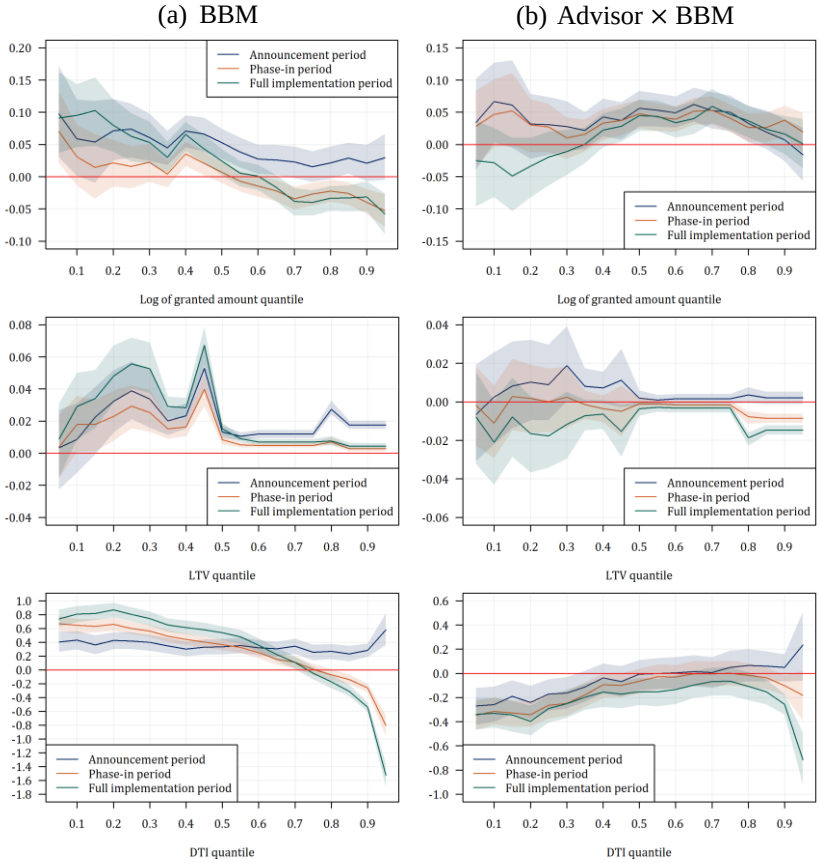
Notes: $+/-2Q$ indicates subsamples of loans granted from 2 quarters begore the announcement of the policy to 2 quarters after the full implementation of the policy. Pre-announcement period is the reference category for the policy-related variables. Clustered standard errors at the bank level are reported in parentheses. * p<0.1, ** p<0.05. *** p<0.01. Source: National Bank of Slovakia.

The results of quantile regressions are displayed in Figure 1. As a result of bunching, we observe increased volatility of the effects in the LTV quantiles referring to the regulatory limits. The significant positive effect of the policy during the announcement period, and especially the positive effect at the right end of the distributions confirms the presence of front-loading behavior (panel a). The impact of the policy implementation (phase-in and full implementation) is in general positive and stronger in lower quantiles, gradually turning weaker and below the

average impact when reaching higher quantiles. This means that the higher increase in the volume of loans, LTV and DTI after the policy implementation happened in the part of the distribution below the implemented limits, pushing this part of the distribution to the right, closer to the regulatory burden. Naturally, the part of the distribution being closer to the limits or above was affected less strongly or even negatively. We observe different impact of the policy implementation on mediated loans mostly at the highest quantiles, supporting the previous findings from regression analysis, that the policy was even more restrictive for advisor-mediated loans (panel b).

The results of the quantile regressions extend the findings of the OLS regressions and explain more complex effect of advisors as well as different effects of policy changes on the distribution of loans, including the bunching at the regulatory thresholds. Moreover, these results revealed an interesting additional information about the effect of the policy. The LTV and DTI limits were designed to cut off the riskiest loans and thus mitigate the fast growth of loans through the upward pressure on loan volumes. However, it seems that the market compensated this missing mass by producing more loans still below, but closer to the limits. Moreover, the window between the announcement and implementation of the policy was used to front-load with loans exceeding these limits.

Figure 1: Quantile effects of the policy on selected loan outcomes



Notes: The figure shows the effect of advisors vis-à-vis the policy on the distribution of selected loan outcomes. The estimation sample includes loans granted from 2 quarters before the announcement to 2 quarters after the full implementation of the policy. The pre-announcement period is the reference category for the policy related variables. 95% confidence bands estimated from 1000 bootstrap replications are represented by the light-colored areas. The red line indicates the zero-effect threshold.
Source: National Bank of Slovakia.

5.2 Opportunity Taken, Opportunity Missed: Household Debt and Subjective Well-being in Slovakia

Table 3 presents the results of estimated impact of debt holding on life satisfaction of households. In general, holding mortgage debt increases

life satisfaction score of households by 0.22 points (specification 1). However, when we allow this effect to vary by year (specification 2), we see that the positive effect is solely driven by mortgage holders in 2021 (increase by 0.38 points). Beside the effects of debt and other financial and socio-demographic drivers of subjective well-being, the life satisfaction of households increased in general by 0.24-0.32 points between waves. This could indicate an improvement in the overall living conditions of Slovak households.

In specification 3, we estimate the effect of mortgage debt holding specifically among homeowners to study the impact of debt on household life satisfaction via the financing channel. However, the estimated effect of the financing channel may be distorted when considering the full sample of homeowners. First, the full sample of homeowners can include those who bought their house with a mortgage and have since repaid it. Second, the purchase may have occurred a long time ago. Therefore, we run the same estimates on a subset of "new" homeowners, i.e., those who purchased their residence within the past four years, to better isolate the effect of using mortgage debt to finance house purchase in contrast of other financing strategies, such as own funds or heritage (specification 4).

The positive effects of having a mortgage debt in 2021 also apply to the subset of homeowners. Compared to outright homeowners, homeowners with mortgages report an additional increase of 0.28 score points in 2021, although it is statistically insignificant. Focusing closely on the group of the new homeowners, this effect becomes much larger (+2.13 score points).

At first glance, our results may appear to contradict usual results achieved in empirical literature, where outright homeownership comes with a higher well-being premium compared to mortgage-financed homeownership, as the latter goes hand in hand with psycho-social stress. However, it is important to note, that the overall effect of mortgage debt financing has not been statistically proven. Among new homeowners it even points to a relatively large, although insignificant, negative effect of

-0.84 score points. Thus, rather than questioning current empirical knowledge, our results once again highlight the life satisfaction premium among mortgage market participants in 2021.

Table 3: Effect of debt holding on household life satisfaction

	(1)	(2)	(3)	(4)
Mortgage debt	0.223**	0.019	0.100	-0.835
	(0.101)	(0.144)	(0.152)	(0.666)
Non-mortgage debt	-0.162*	-0.045		
	(0.098)	(0.130)		
Mortgage debt × 2021		0.384**	0.275	2.128**
		(0.191)	(0.218)	(0.943)
Non-mortgage debt × 2021		-0.238		
		(0.199)		
2021	0.299***	0.244*	0.376**	-0.699
	(0.099)	(0.140)	(0.151)	(0.630)
Financial characteristics	Yes	Yes	Yes	Yes
Socio-dem. characteristics	Yes	Yes	Yes	Yes
Subsample	All	All	Home-owners	New home-owners
N	4,195	4,195	3,689	163
R^2	0.238	0.241	0.195	0.299

Notes: The sample is adjusted using weights resulting from the propensity score weighting approach (balancing covariates between households with and without any type of debt in specifications 1 and 2 and between households with and without mortgage debt in specifications 3 and 4). Robust standard errors are reported in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Source: HFCS 2017 and 2021.

So far, we have only focused on the effects of holding debt on household life satisfaction (in various estimation setups). Next, we focus more closely on credit access channel and analyze the effect of being credit constrained. We analyze the sample of households that applied for any type of credit within the last three years prior to the survey. The results are reported in Table 4. As in previous analyses, we begin with a simpler specification that estimates the overall effect of credit constraints (specification 1) on life satisfaction. We then move on to a more complex specification that differentiates between the effects of credit refusal and

credit reduction, as well as the possible changes in these effects between survey waves (specification 4).

In general, a credit refusal "hurts" more than a reduced credit amount. In 2021, being constrained had a significantly negative effect on the life satisfaction of loan applicants (-1.17 score points). This was primarily driven by credit refusals, which decreased life satisfaction scores by additional 1.46 points, compared to the overall effect of credit refusal.

Table 4: Effect of credit constraints on household life satisfaction

	(1)	(2)	(3)	(4)
Credit constrained	-0.349	0.051		
	(0.240)	(0.310)		
Credit constrained × 2021		-1.167**		
		(0.582)		
Reduced credit			-0.264	-0.031
			(0.305)	(0.377)
Refused credit			-0.457	0.157
			(0.307)	(0.404)
Reduced credit × 2021				-0.777
				(0.768)
Refused credit × 2021				-1.463**
				(0.735)
2021	0.278	0.817***	0.308	0.820***
	(0.277)	(0.259)	(0.277)	(0.260)
Financial characteristics	Yes	Yes	Yes	Yes
Socio-dem. characteristics	Yes	Yes	Yes	Yes
N	458	458	458	458
R^2	0.381	0.395	0.381	0.398

Notes: The sample is adjusted using weights resulting from the propensity score weighting approach (balancing covariates between constrained and not constrained households that applied for a loan in the last three years). Robust standard errors are reported in parentheses. * p<0.1, ** p<0.05, *** p<0.01.
Source: HFCS 2017 and 2021.

The results suggest that households were aware of this unique opportunity to acquire their desired place for living, before the "door close", and realized it might not come around again soon. Those who took full advantage of it and acquired their desired property experienced a sense of relief accompanied by an additional increase in their perceived

well-being. Conversely, those unlucky ones, who made the decision too late, and were refused on credit, experienced an additional "happiness deduction". On the top of that, already indebted households also seem to consider the current market conditions when evaluating their life satisfaction and adjust the perception of their indebtedness based on that.

In the final part of our analysis, we explore how the intensity of debt influences the extent to which households derive utility from meeting their initial needs through debt financing. We use debt service-to-income (DSTI) indicator as an objective measure of household debt burden. It is the most relevant debt intensity indicator for measuring the degree of potential stress households face in servicing their debts. We run the OLS regression (4) separately for each year, as the effect of debt intensity in 2021 might be distorted by "Lex Corona" repayment deferral program. The results are reported in Table 5.

In 2017, the least debt burdened households report lower life satisfaction by 0.39 score points compared to "adequately" indebted households[13]. This could be explained by the potential structure of this category. For example, it could include households with unused credit capacity potential, households with primarily lower – non-mortgage debt, or households that have already repaid most of their mortgage, which they had taken a long time ago, so its effect already diminished. As we move up across the categories above the 60% threshold, the effect becomes negative again and gradually increases. The most debt-service burdened households report lower life satisfaction by more than 1 score point compared to the reference category.

Results reveal, that up to a certain value of debt service burden households do not feel stressed and may even benefit from purchase-related positive effect. However, beyond that point, the intensity of the debt begins to take its toll. In summary, the psycho-social stress from

[13] We refer to households that are adequately indebted as those that have a non-negligible debt burden but do not exceed the current DSTI limit threshold set by the NBS, i.e., with $DSTI \in (30\%, 60\%]$.

being over-indebted can cancel out, or even outweigh, the positive purchase-related effect of debt.

Estimations for 2021 still do not reveal any significant effect, except suspiciously strong and positive effect of over-indebtedness on life satisfaction. This strengthen our beliefs of 2021 data being contaminated with Covid-19 pandemic effects.

Table 5: Effect of debt intensity on household life satisfaction

	(1)	(2)
DSTI $\in (0\%, 30\%]$	-0.390**	-0.091
	(0.182)	(0.216)
DSTI $\in (60\%, 100\%]$	-0.489	0.456
	(0.348)	(0.559)
DSTI $> 100\%$	-0.663	-0.053
	(0.460)	(1.163)
DSTI < 0%	-1.029*	1.963***
	(0.610)	(0.686)
Financial characteristics	Yes	Yes
Socio-dem. characteristics	Yes	Yes
Subsample	2017	2021
N	546	465
R^2	0.277	0.270

Notes: The sample is adjusted using survey weights. DSTI $\in (30\%, 60\%]$ is the reference category of the respective variable. Robust standard errors are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: HFCS 2017 and 2021.

5.3 The Impact of Loan Payment Deferral on Indebted Households and Financial Stability during the Covid-19 Pandemic: Survey Results from Slovakia

We estimate different specifications of the probability to opt for a deferral and present the results in Table 6. All specifications include standard socio-demographic characteristics of the respondent, such as university education, age, and sex as well as the pre-crisis level of DSTI. As possible explanatory variables such as changes in economic status, changes in income or working in a sensitive sector are highly correlated, the first specification includes only changes in the economic status of the

household members. The second specification includes a dummy that is equal to 1 if the respondent works in a sensitive sector. The third specification includes change in income (IHS transformed), while the fourth specification considers all of them. All specifications also include region and bank fixed effects to capture any supply-side effects of the credit market.

Table 6: Probit Estimates of the Determinants of the Use of Deferral (Wave 1)

	(1)	(2)	(3)	(7)
Some household members report changes in economic status	0.030***			0.012
	(0.011)			(0.012)
All household members report changes in economic status	0.039***			0.011
	(0.014)			(0.015)
Work in a sensitive sector		0.036*		0.016
		(0.021)		(0.021)
Income change (IHS transformed)			-0.006***	-0.005***
			(0.001)	(0.002)
Before-crisis DSTI (Arctangent)	0.114***	0.117***	0.098***	0.100***
	(0.020)	(0.022)	(0.019)	(0.019)
University education	-0.032***	-0.033***	-0.025**	-0.025**
	(0.011)	(0.012)	(0.011)	(0.011)
Age	-0.001**	-0.002***	-0.001**	-0.001**
	(0.001)	(0.001)	(0.000)	(0.000)
Male	-0.017	-0.017	-0.015	-0.013
	(0.010)	(0.011)	(0.010)	(0.010)
Region and bank FE	Yes	Yes	Yes	Yes
Pseudo R2	0.19	0.18	0.21	0.21
N obs.	974	974	973	973

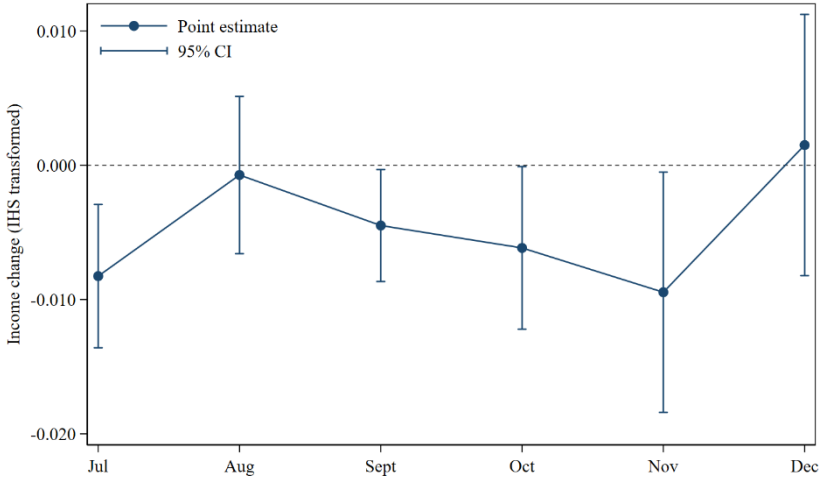
Notes: Marginal effects presented are evaluated at the mean of explanatory variables. Robust standard errors are presented in parentheses. Regressions are estimated using survey weights. Dummy variable for "None of household members reported change in economic status" is the reference category of the respective dummy variable sets. IHS denotes the inverse hyperbolic sine transformation. We transform DSTI by an arctangent function to scale down some very large values and stack originally negative values next. The transformed values are bounded on $(0, \pi)$ and the most frequent DSTI values up to 60% are mapped almost linearly. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Source: Survey of Indebted Households, National Bank of Slovakia.

The estimation results do indeed show a significant impact of changes in income/economic status on the decision to defer. The change in income

enters the regression with a negative sign, i.e., the greater the fall in income due to the crisis, the more likely a household was to use the deferral. The change in the economic status also has the expected sign: if the job of one or both household members was negatively affected, these households were more likely to opt for a deferral. Finally, employment in a sensitive sector also increased the likelihood of a request for deferral.

It appears that economic resources, namely income, is the key driver of negative expectations, as the change in income enters the regression with a significant negative coefficient in the majority of cases. The higher the drop in income, the lower the probability that the household expected to repay its debt after the end of the moratoria. The evolution of the marginal effects of the income change is summarized in Figure 2.

Figure 2: Marginal Effects of the Change in Income on the Probability to Have Negative Expectations about the Ability to Repay Loans after the End of Moratorium



Notes: This figure plots marginal effects of the change in income on the probability to have negative expectations regarding the ability to start repaying the debts once the debt payment moratorium policy is lifted.
Source: Survey of Indebted Households, National Bank of Slovakia.

The level of financial burden captured by the pre-crisis DSTI or the change in the DSTI enters the regression with significant coefficients mainly for the data from the first three waves without using weights. While the change in the DSTI reflects changes in income, a positive coefficient on the pre-crisis DSTI implies that households with higher debt burden before the crisis had a higher probability of expecting difficulties in repaying their debts.

6 Conclusion

The first essay offers valuable insights into the complex dynamics of mortgage lending and the effectiveness of macroprudential policies, focusing on a market characterized by active implementation of borrower-based measures and a significant presence of financial advisors.

We find robust evidence that mortgages mediated through financial advisors are granted with higher amounts and elevated risk parameters, such as LTV and DTI, even after controlling for potential selection effects. Extending the maturity of these loans enables advisors to facilitate loans with monthly installments comparable to those of non-mediated loans. Advisors have a stronger influence on older borrowers and have tendency to negotiate larger loans for more creditworthy clients.

The impact of LTV and DTI tightening in 2018 is ambiguous, largely depending on the design and the structure of the mortgage market. The announcement led to an immediate increase in the granted amount, LTV, and DTI on average. More interestingly, the significant positive effect persists even at the highest quantiles of the distributions of the considered loan outcomes. This can be explained by the phenomenon of front-loading, i.e., increased demand for loans potentially surpassing the limits once they become binding. This is particularly the case for younger, less-educated and lower-income borrowers, i.e. those who are potentially more constrained by the forthcoming policy tightening. Front-loading behavior is even more pronounced for mediated loans, emphasizing the importance of mortgage market specifics in macroprudential policy

transmission. At the same time, mediated loans were more negatively affected after the policy was implemented, as they already had higher values of LTV, DTI, and loan amounts prior to the tightening. This has implication for policy design. While an implementation lag makes policies more predictable, it also leads to front-loading, implying a difficult trade-off for policymakers.

Average effects often mask significantly different reactions across various parts of the loan distribution. We document a positive impact of the LTV and DTI tightening implemented in 2018 in the lower quantiles of the distributions for LTV, DTI, and granted amounts, and, in contrast, a negative impact in the upper quantiles. This suggests that while the policy successfully dampened the production of the riskiest loans, as intended, it indirectly led to the production of loans with parameters still below but closer to the established limits.

Effective policy design requires a granular analysis of country-specific loan distributions and processes. Our essay emphasizes the importance of leveraging detailed microdata to tailor policies accurately and avoid unintended consequences. Future research may focus on longitudinal studies to explore post-granting dynamics and the longer-term impacts of macroprudential interventions on mortgage markets.

The second essay contributes to the growing literature on the relationship between indebtedness and subjective well-being (SWB) by analyzing Slovak households using last two waves (2017 and 2021) of the Household Finance and Consumption Survey (HFCS) and doubly robust OLS regression framework. We examined how different aspects of the credit process, ranging from debt type and credit access to intensity and timing, affect household life satisfaction. Our findings suggest that indebtedness is not inherently detrimental to well-being. Rather, its impact depends significantly on the form of debt, the economic context in which it is taken or held, and, most crucially, the intensity of the debt burden.

A central conclusion of this essay is that mortgage debt can have a positive association with SWB, especially when taken during periods of favorable market conditions. The years between 2017 and 2021, marked by low interest rates and strong housing demand, appear to have reshaped households' perceptions of mortgage debt from a financial liability into a strategic life investment. Conversely, credit constraints had a pronounced negative effect on life satisfaction, especially in 2021, when limited access to credit was perceived as a missed opportunity amid a booming market.

Importantly, our results also confirm that it is not just the presence of debt, but the intensity of the debt burden, measured by the debt service-to-income (DSTI) ratio, that plays a decisive role in shaping subjective well-being. Moderate levels of debt intensity may be associated with increased satisfaction due to the benefits of asset acquisition, but beyond a certain threshold, the psychological and financial stress associated with high debt burdens sharply reduces well-being. These findings underscore the importance of adopting a nuanced, multi-dimensional view of debt when considering its implications for households' quality of life.

The third essay presents the results of a survey focusing on the financial situation and expectations of indebted households, with a special focus on households utilizing the debt payment moratorium during the Covid-19 pandemic crisis.

The share of households expecting serious difficulties with resuming payments after moratorium was relatively low across all survey waves. The share was higher in the early summer of 2020, when the future economic development was still highly uncertain, and then slightly increased again towards the last waves, when the second wave of pandemic renewed more stringent government measures.

Income change of indebted households was a key driver of the decision to opt for a deferral. Despite the overall improvement of income situation over the survey waves, average income of households with deferral was still more than 20% below their pre-crisis level, noticeably

lower than in case of households not asking for deferral. In addition to income change, another factor affecting the decision to opt for deferral was the pre-crisis level of DSTI. The level of respondent's education and the economic sector turned out to be important factors as well in determining the probability to apply for a loan deferral.

While the share of surveyed households reporting difficulties in starting repaying debts after the end of moratoria was relatively small, it was mostly households/individuals suffering big economic (income) losses because of the crisis or having very risky financial debt positions already before the crisis.

Our results have a number of useful takeaways also from a policy perspective. First, the survey confirmed that a significant share of households was strongly hit by the crisis and the lockdown and that the loan deferral helped to improve their liquidity situation. Around 11% of indebted households asked for loan payment deferral. The situation of most of those households normalized over the survey period and the losses foreseen by the survey were manageable for the banking sector. Without the deferral, the default of these households could have significant financial stability implications. On the contrary, because of the support measure, a mere 1% of indebted households did not expect an orderly repayment of their debt, representing also 1% of the retail loan portfolio.

Second, the results confirm the importance of timely and well calibrated macroprudential measures. One of the factors explaining the deferral is high pre-crisis DSTI ratio, as households with high debt payments compared to their income are more sensitive to any income shock than households with sufficient cash buffer. However, the Covid-19 pandemic can serve as empirical evidence of the higher riskiness of households with higher DSTI.

Finally, results also underline the importance of financial education. Households with tertiary education, that in Slovakia is strongly correlated with financial education, entered the crisis in a more prepared way.

7 References used (relevant sources only)

Aller, C. and C. Grant (2018): "The effect of the financial crisis on default by Spanish households," *Journal of Financial Stability*, 36, 39–52.

Allinger, K. and E. Beckmann (2021): "Use of loan moratoria by CESEE households: who are the users and how vulnerable are they?" *Focus on European Economic Integration*, 7–33.

Aristei, D. and M. Gallo (2016): "The determinants of households' repayment difficulties on mortgage loans: evidence from I talian microdata," *International Journal of Consumer Studies*, 40, 453–465.

Austin, P. C. and E. A. Stuart (2015): "Moving towards best practice when using inverse probability of treatment weighting (IPTW) using the propensity score to estimate causal treatment effects in observational studies," *Statistics in Medicine*, 34, 3661–3679.

Bialowolski, P. and D. Weziak-Bialowolska (2021): "Good credit, bad credit: The differential role of the sources of debt in life satisfaction," *Journal of Consumer Affairs*, 55, 967–994.

Borio, C. E. and M. Drehmann (2009): "Assessing the risk of banking crises–revisited," *BIS Quarterly Review*, March 2009.

Bover, O., J. M. Casado, S. Costa, P. Du Caju, Y. McCarthy, E. Sierminska, P. Tzamourani, E. Villanueva, and T. Zavadil (2018): "The distribution of debt across euro-area countries: the role of individual characteristics, institutions, and credit conditions," *International Journal of Central Banking*, 12, 71–128.

Brown, S., K. Taylor, and S. W. Price (2005b): "Debt and distress: Evaluating the psychological cost of credit," *Journal of Economic Psychology*, 26, 642–663.

Cassidy, M. and N. Hallissey (2016): "The introduction of macroprudential measures for the Irish mortgage market," *The Economic and Social Review*, 47, 271–297.

Jarmuzek, M. and R. Rozenov (2019): "Excessive private sector leverage and its drivers: Evidence from advanced economies," *Applied Economics*, 51, 3787–3803.

Jordà, Ò., B. Richter, M. Schularick, and A. M. Taylor (2021): "Bank capital redux: solvency, liquidity, and crisis," *The Review of Economic Studies*, 88, 260–286.

Jurča, P., J. Klacso, E. Tereanu, M. Forletta, and M. Gross (2020): "The Effectiveness of Borrower-Based Macroprudential Measures: A Quantitative Analysis for Slovakia," IMF Working Paper, No. 2020/134.

Kamleitner, B. and E. Kirchler (2007): "Consumer credit use: A process model and literature review," *European Review of Applied Psychology*, 57, 267–283.

Keese, M. (2012): "Who feels constrained by high debt burdens? Subjective vs. objective measures of household debt," *Journal of Economic Psychology*, 33, 125–141.

Kelly, R. and C. O'Toole (2018): "Mortgage default, lending conditions and macroprudential policy: Loan-level evidence from UK buy-to-lets," *Journal of Financial Stability*, 36, 322–335.

Lusardi, A. and P. Tufano (2015): "Debt literacy, financial experiences, and overindebtedness," *Journal of Pension Economics & Finance*, 14, 332–368.

McCaffrey, D. F., B. A. Griffin, D. Almirall, M. E. Slaughter, R. Ramchand, and L. F. Burgette (2013): "A tutorial on propensity score estimation for multiple treatments using generalized boosted models," *Statistics in Medicine*, 32, 3388–3414.

McCaffrey, D. F., G. Ridgeway, and A. R. Morral (2004): "Propensity score estimation with boosted regression for evaluating causal effects in observational studies." *Psychological Methods*, 9, 403.

Mian, A. and A. Sufi (2009): "The consequences of mortgage credit expansion: Evidence from the US mortgage default crisis," *The Quarterly Journal of Economics*, 124, 1449–1496.

Minsky, H. P. (1976): John Maynard Keynes, Springer.

Minsky, H. P. (1986): Stabilizing an unstable economy, vol. 1, Yale University Press, New Haven, Connecticut.

Modigliani, F. and R. Brumberg (1954): "Utility analysis and the consumption function: An interpretation of cross-section data," *Franco Modigliani*, 1, 388–436.

National Bank of Slovakia (2020): "Financial Stability Report November 2020".

Rajan, R. G. (2011): Fault lines: How hidden fractures still threaten the world economy, Princeton University press.

Ridgeway, G., S. A. Kovalchik, B. A. Griffin, and M. U. Kabeto (2015): "Propensity score analysis with survey weighted data," *Journal of Causal Inference*, 3, 237–249.

Tseng, Y.-C. and I.-F. Hsiao (2022): "Decomposing the factors influencing household debt: the case of China," *Applied Economics*, 54, 2627–2642.

8 List of published outputs of the candidate

Cesnak, M., A. Cupak, P. Fessler and J. Klacso (2025). Heterogeneous Impacts of Macroprudential Policies: Financial Advisors, Regulatory Caps, and Mortgage Risk. *Working Papers (Oesterreichische Nationalbank)*, (263).

Cesnak, M., A. Cupak, J. Klacso and M. Šuster (2021): "Fates of indebted households during the Corona crisis: Survey results from Slovakia," *NBS Working paper*, 2/2021.

Cesnak, M., A. Cupak, J. Klacso and M. Šuster (2023). The Impact of Loan Payment Deferral on Indebted Households and Financial Stability during the Covid-19 Pandemic: Survey Results from Slovakia. *Finance a Uver: Czech Journal of Economics & Finance*, *73*(3).

Cesnak, M. and J. Klacso (2021): "Assessing real estate prices in Slovakia – a structural approach," *NBS Working paper*, 3/2021.

Cesnak, M., J. Klacso and R. Vasiľ (2021): "Analysis of the Impact of Borrower-Based Measures," *NBS Occasional paper*, 3/2021.

9 Summary

Household indebtedness has become an intrinsic component of modern economies, enabling consumption smoothing and wealth accumulation. However, as demonstrated in this thesis, the implications of household debt go far beyond individual financial decisions. The Slovak case – characterized by alarmingly low levels of financial literacy, excessive homeownership and rapidly growing mortgage debt in recent years – illustrates how macroprudential risks can escalate quickly in a liberalized credit environment. Therefore, understanding household borrowing behavior is not only a matter of personal finance but a central issue for financial stability and effective economic policy.

This thesis contributes to the growing body of research on household (over-)indebtedness by presenting three empirical studies that examine the dynamics of borrowing in Slovakia. These findings highlight the multifaceted nature of indebtedness, encompassing behavioral patterns, institutional mediation, and policy responses. Using several unique datasets–such as microdata from the Slovak Household Finance and Consumption Survey, administrative data at the retail loan level, or the ad hoc survey on indebted households during the Covid-19 pandemic–and policy evaluation, causal methods, we provide several findings.

First, the study provides a detailed analysis of mortgage lending dynamics and the role of financial advisors in Slovakia's credit market. It finds that loans mediated by financial advisors tend to be larger and riskier, particularly in terms of higher LTV and DTI ratios. Advisors are especially influential among older and more creditworthy borrowers, often encouraging longer maturities to keep monthly installments manageable. The study also reveals that policy tightening in 2018 prompted "front-loading" behavior, especially among younger, lower-income borrowers, who rushed to secure loans before the new restrictions took effect. While these policies reduced the riskiest lending at the upper end of the market, they also unintentionally stimulated loan activity just below regulatory thresholds. Importantly, the policy tightening effects were even intensified by financial advisors. These results point to a need to account for the mortgage market specifics when evaluating such policies. These findings highlight the need for carefully timed and granular macroprudential policy interventions that account for distributional effects across borrower segments.

Second, using Slovak data from the HFCS (2017 and 2021), this study investigates how different aspects of indebtedness affect life satisfaction. It finds that debt itself is not inherently harmful to subjective well-being (SWB); instead, its effects depend on the type of debt, the timing of its acquisition, and especially the burden it imposes. Mortgage debt, when taken under favorable market conditions, can enhance SWB by being viewed as an investment rather than a liability. However, limited access to credit significantly undermines well-being, particularly in booming

market environments. The study emphasizes that debt intensity–measured by DSTI–is the critical factor, with moderate debt levels potentially enhancing satisfaction, but high burdens severely reducing it. These insights underline the need for policies that support responsible borrowing and ensure access to sustainable credit.

Third, this study presents findings from a survey of indebted Slovak households during the Covid-19 pandemic, with a focus on those who used the debt moratorium. While relatively few households expected major difficulties resuming payments, those that did were typically more financially vulnerable, either due to income shocks or already risky debt positions. The moratorium helped stabilize household liquidity, with around 11% of households opting in, and only 1% ultimately expecting to default. The results underscore the importance of timely policy responses, such as payment deferrals, in mitigating systemic risk during crises. Additionally, the study reinforces the role of pre-crisis DSTI as a predictor of vulnerability and stresses the value of financial education. Households with higher education levels navigated the crisis more effectively. These insights are critical for future crisis preparedness and financial stability planning.

A central insight from the thesis is that debt is neither inherently harmful nor beneficial. Its impact depends on how manageable it is, when and why it is incurred, and the capacity of households to adapt to financial shocks. Together, the findings reinforce the importance of tailored macroprudential policies, improved financial education, and proactive risk monitoring. In a world increasingly dependent on household credit, ensuring that borrowing remains sustainable is essential not only for individual well-being but also for long-term financial and economic stability.

10 Extended abstract in the Slovak language

Táto dizertačná práca skúma príčiny a dôsledky (nadmernej) zadlženosti domácností prostredníctvom troch empirických esejí zameraných na Slovensko – krajinu, ktorá zažila jeden z najrýchlejších nárastov zadlženosti domácností medzi štátmi strednej a východnej Európy. Eseje analyzujú rôzne dimenzie zadlženosti, pričom poukazujú na prepojenosť medzi úverovými politikami, trhovými podmienkami a finančnou zraniteľnosťou domácností. Využívajú pritom viacero unikátnych dátových zdrojov – mikroúdaje z prieskumu HFCS, administratívne dáta na úrovni retailových úverov a ad hoc prieskum medzi zadlženými domácnosťami počas pandémie Covid-19.

Prvá esej sa zameriava na vplyv makroprudenciálnych regulácií – konkrétne limitov LTV a DTI – na štruktúru a rizikovosť hypotekárneho trhu. Analýza ukazuje, že zavedenie týchto pravidiel viedlo nielen k obmedzeniu najrizikovejších úverov, ale aj k posunu nízko-rizikovej časti distribúcie úverov bližšie k novostanoveným limitom. Navyše oznámenie sprísňovania viedlo k „predzásobeniu“ (front-loadingu) zo strany mladších, menej bonitných dlžníkov, ktorí sa snažili získať úver pred sprísnením podmienok. Výraznú úlohu pri tomto správaní zohrali finanční sprostredkovatelia, ktorí často motivovali klientov k vyšším úverom s dlhšou splatnosťou, čím prispeli k zvýšeniu rizikového profilu nových úverov. Výsledky podčiarkujú potrebu cielenej a diferencovanej makroprudenciálnej politiky, ktorá zohľadňuje distribučné účinky medzi rôznymi skupinami dlžníkov.

Druhá esej skúma súvislosti medzi zadlženosťou a subjektívnym blahobytom domácností, a to pomocou údajov z dvoch vĺn HFCS (2017 a 2021). Zistenia naznačujú, že samotné zadlženie nie je nevyhnutne negatívne – hypotéky môžu viesť k vyššej spokojnosti, najmä ak sú nadobudnuté za priaznivých trhových podmienok a domácnosti ich vnímajú ako investíciu do budúcnosti. Rozhodujúcim faktorom je však intenzita dlhu – teda miera zaťaženia príjmu splátkami (DSTI). Kým mierne zadlženie môže blahobyt zvyšovať, vysoká dlhová záťaž ho výrazne znižuje. Práca tak poukazuje na dôležitosť dostupnosti

zodpovedného a udržateľného úverovania pre subjektívne aj ekonomické zdravie domácností.

Tretia esej sa venuje analýze zraniteľnosti zadlžených domácností počas pandémie Covid-19, so zameraním na tých, ktorí využili odklad splátok v rámci štátom zavedeného moratória. Približne 11 % domácností túto možnosť využilo, pričom iba malé percento očakávalo problémy so splácaním po jeho skončení. Najzraniteľnejšie však boli domácnosti s vysokým predkrízovým DSTI, nižším vzdelaním či nestabilným zamestnaním. Moratórium prispelo k stabilizácii likvidity a zmiernilo potenciálne systémové riziká. Zároveň výsledky ukazujú, že vyššia úroveň finančného vzdelania ako aj včasné a správne nastavené makroprudenciálne nástroje môžu domácnostiam pomôcť efektívnejšie zvládnuť krízové obdobie.

Naprieč všetkými tromi esejami práca ukazuje, že zadlženosť domácností je mnohorozmerný fenomén s finančnými, sociálnymi a psychologickými dôsledkami. Jej dopady závisia od charakteru dlhu, kontextu jeho vzniku, schopnosti domácností zvládať finančné šoky a tiež od spôsobu implementácie verejných politík. Udržateľné úverovanie, kvalitná finančná gramotnosť a citlivá makroprudenciálna politika sú preto kľúčové nielen pre individuálne finančné zdravie, ale aj pre dlhodobú stabilitu finančného systému.