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Article

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Public Debt Expectations: The More You Know about Public Debt, the Less Optimistic You Are

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Abstract: Macroeconomic expectations influence long-term output, investment, and employment through households' behavior. Policymakers and politicians attempt to predict the behavior of citizens and voters. How individuals form expectations and perceive sovereign indebtedness brings into question public finance sustainability and incumbents' credibility. Based on a cross-country survey in Central and Eastern European countries, we estimate several probit regressions to uncover the effects of economic knowledge on sovereign debt expectations. Robustness tests and additional control confirm the initial results. We find that knowledge about public debt increases the chances of forming negative expectations, while higher financial literacy tends to have the opposite effect. More specifically, individuals with higher public debt knowledge are 5.4 percentage points less likely to show positive expectations, while individuals with higher levels of financial literacy (interest rate and inflation knowledge) are approximately 3.5 percentage points more likely to form positive expectations. The results indicate that public debt expectations are driven by negative biases resulting from the lack of economic knowledge together with insufficiency in understanding economic causal mechanisms. Financial literacy programs could benefit from including information about macroeconomics in curricula. Improving individual abilities to understand macroeconomic mechanisms, including public debt, has the potential to influence expectations and shift behaviors towards desired policy outcomes.

Keywords: public debt expectations; economic knowledge; financial literacy; trust.

Introduction

Expectations about macroeconomics play an important role in policymaking and politics as they sought to predict citizens' behavior. Household expectations about sovereign indebtedness raise concerns over public finance sustainability and incumbents' credibility. Excessive sovereign debt level accumulated over the last decades: in 2018 the US reached a debt-to-GDP ratio of 105% and the European Union's average debt-to-GDP ratio reached 80%. The effects of increased debt levels are intensively debated among economists, but little attention is paid to how people form sovereign debt expectations and what contributes to expectations. Are sovereign debt expectations more likely to depend on political conditions rather than on economic knowledge? Is it more likely for individuals to adapt their expectations according to the level of trust they have in the incumbents? Are higher public debt levels a signal orienting future economic behavior towards tax avoidance? Could economic knowledge and awareness about public debt change households' expectations? Little empirical research has been undertaken on these topics as the measurement of expectations lacks uniformity and clarity due to intrinsic

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constraints of self-reported data (Manski, 2004). Higher debt levels may imply higher taxes for future generations, lower welfare benefits, a desire to avoid future taxes and less support for incumbent politicians.

The main objective of this paper is to uncover how increased levels of public debt knowledge influence expectations. Learning about macroeconomics or receiving information on certain related topics has the potential to increase the likelihood of shifting sovereign debt expectations according to the new information. We employ survey data from Central and Eastern European countries with similar economic and institutional characteristics to undercover what is the effect of economic knowledge on the expectations' tendency towards negativism or positivism. Using four survey items, we first form an indicator assessing different dimensions of public debt expectations, including perceptions over public debt's effects, the degree of individual worriedness and individual opinions about the evolution of public debt. Then, we estimate several ordered probit regressions with various model specifications controlling for different factors that account for: (i) the role of financial knowledge (inflation and interest rate literacy) (ii) the degree of political trust in the incumbent government (iii) the role of corruption perceptions. Drawing on the recent studies regarding the role of information in forming expectations, we hypothesize that higher levels of economic and financial knowledge exert a positive impact on individuals' expectations about public debt. Regarding the role of trust and corruption, we expect lower levels of trust and higher levels of corruption to have a negative impact on expectations. Previous studies have shown that trust and individual perceptions of corruption have little effect on vote decisions (Choi & Woo, 2010), but their impact on economic expectations is less studied.

We find that public debt knowledge or how much a respondent is aware of the size of public debt increases the chances of forming negative expectations. Contrary to more general studies which show that increasing the degree of economic knowledge individuals have led to more optimistic opinions about the evolution of the economy (Walstad & Rebeck, 2002), the case of public debt expectations shows the reverse. However, increasing the level of financial literacy leads to the formation of positive expectations about public debt. The results indicate that public debt expectations are driven by negative biases resulting from the lack of economic knowledge together with insufficiency in understanding economic causal mechanisms. Additionally, we confirm our hypothesis concerning trust and individual perceptions of corruption: individuals with lower levels of trust and individuals who expect higher levels of corruption are more likely to form negative expectations.

In terms of implications, the results shed light on the importance of economic knowledge for forming expectations. Individuals improve their decision-making processes as they receive and grasp information. Decisions about individual expenditure and saving, but also individual decisions about potential elected officials are influenced by current economic expectations. While calibrating informational dynamics to achieve the best possible fiscal and political outcome may be an extremely difficult task, expanding individuals' toolkits for understanding economics together with increased financial literacy has the potential to reduce negative biases and change expectations. Up to now, limited empirical evidence includes the role of expectations in analyzing the effects of macroeconomic policies. Survey data is often unavailable or difficult to collect which hinders the possibility of designing micro-based macroeconomic studies which include expectations. Several studies indicate how government can anchor expectations to promote economic stability, but their importance is limited in the literature particularly in connection to public debt (Hilscher et al., 2022; Roth et al., 2020).

The remainder of this paper is structured as follows. In the next section, we discuss the related literature discussing both the role of information provision in forming expectations and their implications for incumbent governments. Section 3 presents the dependent and explanatory variables, while Section 4 describes the empirical strategy employed for testing the hypotheses. Second 5 presents the results and section 6 concludes emphasizing policy recommendations and future research.

Literature review

The literature about macroeconomic expectations started with the analysis of preferences based on individual choices which assumed that under uncertainty expectations are formed and inevitably influence individual choices. The last decades marked a growing number of research papers analyzing how expectations are formed focusing on the role of information. However, most studies are limited by the lack of data as uncovering individual perceptions requires geographical locus and survey-targeted objectives. These micro-founded macroeconomic perspectives and models will still be developed over the next few years. For instance, Hilscher et al. (2022) include investors' expectations when analyzing the effects of inflation on the real value of public debt, but overall only a limited number of studies discussed how sovereign debt beliefs, attitudes and expectations reflect individual characteristics, perceptions, and knowledge (Roth et al., 2020).

Above all, the degree of negativity or positivity regarding public debt has a double meaning. First, public debt expectations reflect an attempt to understand the future behavior of the individuals in terms of expenditure and saving as sovereign debt represents a signal for potential future taxation. Even though it may be difficult to envision that people understand fiscal policy from a theoretical perspective, they may shape their expectations according to different economic indicators regardless of their awareness of public debt: observing increased public investments or aid in one period of time may lead to increased negative expectations about taxation in the next period of time. In this sense, individual expectations about public debt are meaningful for the stability of the economy through fiscal policy during a crisis. This interpretation is supported by a large number of papers studying how households react to fiscal shocks (D'Acunto et al., 2018; Shapiro & Slemrod, 2009). Second, public debt expectations reflect a signal for the reelection of incumbent politicians as they reflect the level of trust in the government's capacity to manage financial resources. This expectations-trust channel is assessed in the literature by studies analyzing the impact of trust in government on macroeconomic outcomes (Zak & Knack, 2001) or the impact of trust on individual behavior (Citrin & Stoker, 2018; Marien & Hooghe, 2011).

Although a limited number of studies discussed sovereign debt expectations, there is a large amount of literature discussing perceptions of other macroeconomic variables and the role of information in shifting expectations. Most of the studies discuss how individuals form inflation expectations (Bruine et al., 2011; Cavallo et al., 2017; Malmendier & Nagel, 2016). For instance, Malmendier and Nagel (2016) suggest that inflation expectations are formed according to past inflation experiences. Others explored the information provided in forming expectations (Armantier et al., 2016; Badarinza & Buchmann, 2009). Armantier et al. (2016) provide information that individuals update their inflation expectations when they are presented with certain types of information. More related to fiscal policy, Karadja et al. (2017) provide evidence for how people change their preferences for redistribution once they are informed their relative income is higher than what they perceive compared to other individuals' incomes. Kuziemko et al. (2015) find that receiving information affects individuals' views on inequality, but not for taxation preferences. They shed light on the potential role of distrust in government which

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significantly lowers the effects of information on changing policy preferences. Overall, the literature suggests that information provision plays a significant role in shifting expectations. Concerning government spending preferences, Roth et al. (2020) find that when learning about the debt-to-GDP ratio individuals reduce their preferences for government spending increases. They suggest that these "learning" effects are time-persistent and occur after changes in individual expectations. They find that in the long-term, people's expectations about fiscal sustainability change due to the information dissemination treatment about public debt. In contrast, they do not find any significant effects on taxation expectations suggesting that the "learning effects" produce an immediate preference for smoothing public goods consumption. Provided by experimental evidence, all the above-mentioned studies discuss how information changes people's expectations or preferences about government spending and different policy options, but instead, our paper provides some insights into how expectations about financing instruments can influence behavior.

Regarding the role of economic expectations in signaling the reelection of incumbent politicians, the literature is focused on retrospective voting which seeks to explain that voters evaluate incumbents based on the evidence obtained during the office tenure (Duch & Stevenson, 2008; Lewis-Beck & Stegmaier, 2013). Studies argue that retrospective voting is based on the economic conditions' evaluation which has its explanations in macroeconomic indicators grounded in reality (Markus, 1992). Excluding the influence of political ideology over voting behavior, Lewis-Beck and Stegmaier (2013) describe that voters correctly evaluate the economic circumstances which are not shaped by their political affiliations. Moreover, other studies argue that expectations and perceptions over economic conditions have been neglected and the effects of political partisanship have been overstated despite the fact that voters objectively evaluate economic conditions (Lewis-Beck et al., 2008; Lewis-Beck & Martini, 2020; Nadeau & Lewis-Beck, 2001). This politics stream of research suggests that economic expectations are less associated with political affiliations and partisanship than intuitively believed. Evidence also supports the idea that voters use prospective economic conditions when they choose their next elected officials (Duch & Stevenson, 2008). These expectations are defined through prospective assessments: voters form their preference for the incumbent government based on how what they expect from the future (Lockerbie, 1991). Since democracy is a game based on political cycles, the retrospective model of voting works in conjunction with the prospective model. The evaluation of the economic situation is often linked with higher/ lower levels of satisfaction when individuals believe that institutions and incumbents will (not) be able to offer solutions to potential economic conditions (Loveless & Binelli, 2020). Therefore, certain political attitudes about the incumbent government may also affect the formation of macroeconomic expectations. Political trust is often associated with illegal behavior like tax fraud and decreased support for public goods provision (Citrin & Stoker, 2018; Marien & Hooghe, 2011) or with the negative impact of the lack of trust on macroeconomic outcomes (Zak & Knack, 2001), but it is rarely discussed in relation to economic expectations (Seyd, 2015) which may act as an intermediate channel between trust levels and support for incumbents.

Instead, the literature on public debt, trust and expectations is substantial with public debt regarded as a distributional conflict between creditors and citizens (Streeck, 2014) since raising public debt is often accompanied by growing tax avoidance. However, this literature provides empirical evidence for the indirect relationship between government debt expectations and voting behavior. Alesina and Tabellini (1990) examine how public debt reduction is sanctioned by voters and how incumbents use public debt to constrain their opponents' chances of winning the next elections. Regardless of the casual channel passing through expectations, these models cannot explain the reelection of incumbents who increase debt. Thus, it may be that voters care about future expenditure and taxation

punishing the incumbents for public debt increases. Contrary to what theoretical models propose, empirical studies find no correlation between debt increases and the re-election of incumbents (Alesina et al., 2013; Brender & Drazen, 2008), but the hypothesis concerning the relationship between taxation expectations and trust reflects a certain extent what drives the level of individual negativism or optimism affecting expenditure and saving choices. Moreover, the contribution of information and economic knowledge is rarely taken into account and is mostly omitted in explaining research results about economic voting (Alesina et al., 2013; Loveless & Binelli, 2020).

This study provides empirical evidence to show the role of economic knowledge in forming, shaping, and shifting macroeconomic expectations. Although it applies exclusively to countries from the CEE region characterized as emerging economies, it connects two streams of literature: on the one hand the literature on macroeconomic expectations formations which influence individual behavior and, on the other hand, the literature about the role of expectations for elections.

Data and sample

The source of the household data is represented by the OeNB Euro Survey (2021) carried out by Oesterreichische Nationalbank since 2007. The survey covers six CEE countries (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania) which are part of the European Union, but not part of the European Monetary Union. Given these similarities, we focus exclusively on these six countries as their institutional and economic characteristics may not predominantly differ from one country to another. The sample of individuals for each country is representative of the entire population structure with respect to socio-demographic characteristics. We examined data from the 2018 survey wave which covers our topic of interest: public debt knowledge and expectations. For our estimations, mean data imputation methods were used to keep the soundness of the analysis. The total sample includes 6035 observations. A detailed presentation of the main variables is presented in Appendix A, while descriptive statistics are presented in Appendix B.

We document individuals' expectations about the evolution of public debt. To measure these expectations, we make use of a subjective index covering four survey questions. The index accounts for three different dimensions in households' expectations: direct bearing perceived effects (how individuals perceive public debt in relation to taxation expectations, future pension and welfare benefits), the degree of worriedness (how much of a concern an individual assigns to future public debt development) and individual certitude about public debt potential evolution (how much certitude an individual assigns to public debt increase over the next 10 years). 1 Since the questions are designed on a 6-point Likert scale, we compute the index regarding public debt expectations as an average of all responses given by each individual. We then assign each value to the corresponding Likert intervals to obtain three categories: "positive expectations", "moderate expectations", "negative expectations". Across our sample, it turns out that most individuals have negative expectations followed by individuals with moderate expectations. This pattern applies in all countries from our sample except the Czech

[1] Public debt expectations questions, as well as all the other questions, were carefully designed by OeNB. A detailed description of other available survey question can be found in Eller et al. (2021). To avoid other methodological limitations and restrictions, we choose to form an index using questions that are well-balanced in terms of negativity or positivity. All index questions reflect negative statements. As a caveat, the framing of these questions towards a sense of negativism may lead respondents to also adopt a negative attitude towards public debt. In this sense, the index is prone to negativity bias. However, to reduce this bias the framing of the general question familiarizes the respondents with the concept of public debt from an individual perspective presenting public debt as individual private debt.

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Republic which has a higher share of individuals showing moderate expectations. Figure 1 presents individuals' expectations in each country. Romania and Bulgaria register the highest share of respondents showing negative expectations, (85% and 82% of respondents), compared to those with moderate and positive expectations (15% and 18% of respondents), while Croatia, Hungary, and Poland have the shares between categories are more equally distributed.

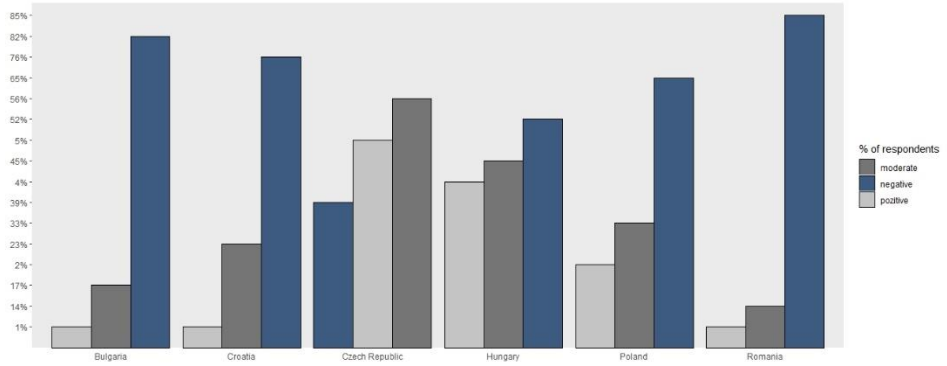

Figure 1. Public debt expectations in Central and Eastern Europe
Source: own processing

The main objective of this paper is to assess how respondents' degree of knowledge about public debt influences their expectations. As examining how respondents understand the economic mechanisms and implications of public debt may be a complex task difficult to achieve, the main explanatory variable accounts for the level of public debt awareness rather than respondents' proficiency in comprehending public debt economic dynamics. Figure 2 depicts how many respondents know the size of public debt in their respective countries. The highest share of individuals that correctly estimated the size of public debt were nationals from the Czech Republic, which surprisingly have the lowest share of negative expectations and the highest share of individuals aware of public debt. Romania and Croatia (approximately 13%) show the lowest shares of individuals who correctly answered the question about public debt, while the other countries register slightly higher shares. Overall, the percentages of individuals who are not aware of public debt size levels are significantly higher than those who answered correctly. This descriptive evidence is consistent with previous findings related to voters' perception of the level of government debt (Allers et al., 1998; Roth et al., 2020).

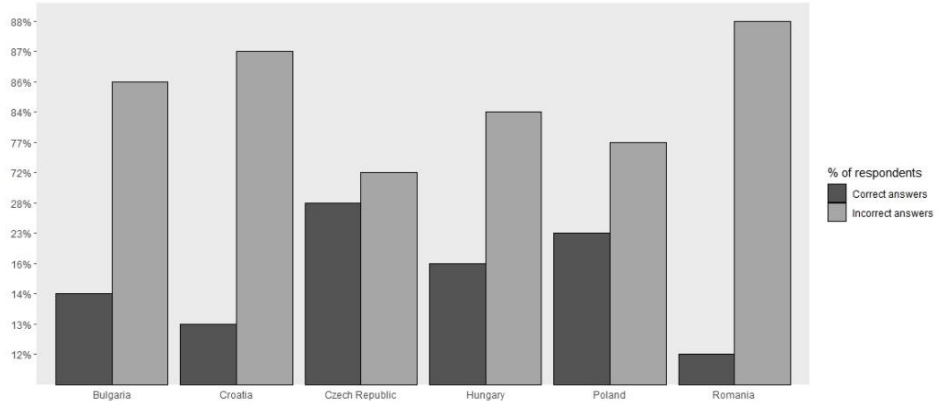

Figure 2. Public debt knowledge in Central and Eastern Europe
Source: own processing

Other economic knowledge measures such as inflation or interest rate knowledge are included among the explanatory variables to account for their relevance in understanding

public debt indebtedness. Studies suggest that economic knowledge is positively associated with cognitive ability and financial literacy (Lin & Bates, 2022). We choose to include inflation and interest rate knowledge as these two measures represented the international standard for measuring individual financial literacy proposed by Lusardi and Mitchell (2017). Additionally, public debt expectations are influenced by a series of factors related to government ability to spends efficiently financial resources. Recent studies have linked economic expectations with the degree of satisfaction in democracy, while trust is a mediating predictor which has a decisive role in forming citizens' evaluation of government performance (De Simone et al., 2021). Therefore, we include trust and corruption perception measures as explanatory variables.

Empirical framework

The main objective of this paper is to analyze how individuals' knowledge about public debt influences their expectations. We estimate an ordered probit regression which takes as a dependent variable different levels of public debt expectations. The respondents rate their expectations about public debt on an ordered scale. The ordered categories for the dependent variable take the following form: (1) negative expectations; (2) moderate expectations; (3) positive expectations. Thus, the variable measuring public debt expectations for respondent *i* has the following form:

$$PDE_i = \left\{ \begin{array}{ll} 1 & \text{negative expectations} \\ 2 & \text{moderate expectations} \\ 3 & \text{negative expectations} \end{array} \right\} \quad (1)$$

The respondent can be included in only one category defined with meaningful ordered according to their answers. The probability of answering 1 to 3 is represented by an ordered probit function X of individuals' sociodemographic characteristics, public debt knowledge and other economic and political attitudes:

$$P(T_i \in \{1,2,3\}) = X(SD_i PDK_i EPF_i) \quad (2)$$

To improve the readability of our results, we compute and report average marginal effects (AME) of all our ordered probit models. AME estimate the partial effect of the explanatory variables on the dependent variable using the observed values of the covariates. These measures are a direct representation of the average probability change in the dependent variable when one of the explanatory variables increase by one unit.

Results and discussion

Public debt knowledge

Previous research has shown that economic knowledge varies across socio-demographic characteristics depending on past experiences, financial literacy and cognitive abilities (D'Acunto et al., 2019; Lin & Bates, 2022; Lusardi & Mitchell, 2017; Malmendier & Nagel, 2016). In contrast to testing financial literacy and economic attitudes, economic knowledge refers to the capacity of comprehending casual relationships in economic activity and the main economic concepts (Wobker et al., 2012). Thus, public debt knowledge refers to the ability of the respondent to reason about how public debt works and what are its implications.

The results of the basic socio-demographic indicators correspond to previous findings. Table 1 (Spec. 1) relates public debt knowledge to a set of socio-demographic

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characteristics. It indicates that higher levels of education, employment and gender are correlated to higher public debt knowledge: respondents with higher education and individuals employed display significantly higher levels of awareness about public debt, while female respondents are 4.7 pp less likely to know about public debt. These results are in line with the results from Lin and Bates (2022) and D'Acunto et al. (2019).

Concerning the relationship between public debt knowledge and financial literacy, we introduce in Table 1 (Spec. 2 and Spec. 3) the main measures of financial literacy: inflation and interest rate knowledge. The results prove the association between financial literacy and economic knowledge: across all model specifications, individuals who understand inflation and interest rate have higher levels of public debt knowledge. Additionally, interest rate knowledge has higher positive effects than inflation knowledge: individuals understanding inflation are only 3.7pp more likely to understand public debt, while respondents who comprehend interest rate have a 5.5pp higher likelihood to understand public debt. These results are in line with the findings of Lin and Bates (2022) who describe that economic knowledge is positively associated with financial literacy depending on individual cognitive abilities.

Table 1. Influencing factors of public debt knowledge

	Public debt knowledge				
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Age	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Education low	-0.008 (0.018)	-0.005 (0.019)	0.004 (0.019)	0.003 (0.019)	0.005 (0.019)
Education high	0.056*** (0.012)	0.052*** (0.012)	0.048*** (0.012)	0.048*** (0.012)	0.042*** (0.012)
Employed	0.028*** (0.011)	0.028*** (0.011)	0.028*** (0.011)	0.028*** (0.011)	0.028*** (0.011)
Female	-0.054*** (0.010)	-0.053 (0.010)	-0.050*** (0.010)	-0.050*** (0.010)	-0.047*** (0.010)
Manages HH finances	-0.005 (0.011)	-0.004 (0.011)	-0.0011 (0.011)	-0.003 (0.011)	-0.003 (0.011)
With children	0.008 (0.011)	0.008 (0.011)	0.008 (0.011)	0.008 (0.011)	0.008 (0.011)
Income high	0.022 (0.017)	0.020 (0.017)	0.022 (0.017)	0.018 (0.017)	0.016 (0.017)
Income low	-0.008 (0.016)	-0.003 (0.016)	-0.002 (0.016)	-0.001 (0.016)	0.000 (0.016)
Income: no answer	-0.021* (0.012)	-0.018 (0.012)	-0.017 (0.012)	-0.019 (0.012)	-0.016 (0.012)
Inflation knowledge		0.048*** (0.010)	0.037*** (0.010)	0.036*** (0.010)	0.036*** (0.010)
Interest rate knowledge			0.055*** (0.011)	0.055*** (0.011)	0.052*** (0.011)
Past debt awareness				-0.037*** (0.013)	-0.037*** (0.013)
Economic interest					0.041*** (0.010)
Log-L	-2752.60	--2740.65	-2727.12	-2723.09	-2714.75
N	5988	5988	5988	5988	5988
Nagelkerke's R2	0.0209	0.0274	0.0347	0.0369	0.0413

Note: The presented results are the average marginal effects of a probit model. The dependent variable takes the value of one if the respondent correctly answered the public debt questions related to his/ her country. Standard errors are presented in parentheses;,** , and *** denote statistical significance at the 10%, 5%, and 1% confidence levels.*

Source: own processing

Research suggests that economic knowledge depends on the degree of awareness formed through past experiences (Malmendier & Nagel, 2016). As some studies suggest that inflation expectations are based on previous inflation experiences, public debt knowledge may also be influenced by respondents' degree of awareness regarding previous levels of public debt. Instead, the results suggest a negative relationship: respondents who are aware of the evolution of public debt during the last decades are 3.7 pp less likely to have higher levels of knowledge. This result has ambiguous meanings: considering the fact that public debt increased over the last decades, it may be that previous debt awareness is linked to inflationary pressures rather than strictly to knowledge, but its effects and implications are unclear for most of the respondents. Another explanation could lie in the existence of negative emotions which hinder the accumulation of knowledge since the dummy variable intrinsically measures the degree of worry respondents have over previous public debt levels. Finally, we control respondents' economic interests. The results from the dummy variable *economic interest* are in line with our expectations. Having a specific interest in economic issues increases the likelihood of public debt knowledge by 4.4pp.

Public debt expectations

Table 2 presents the marginal effects that respondents have positive public debt expectations. Concerning the effects of public debt knowledge on expectations, we find a negative correlation between the two variables. The respondents who are aware of the level of public debt in their countries are in all model specifications less likely to form positive expectations, but the magnitude of the likelihood decreases with each supplementary factor included in the regression models. However, the direction of causality remains valid across many specifications. In Spec. 1, respondents with higher public debt knowledge are 9.3 pp less likely to show positive expectations, while in Spec. 3 which accounts for trust and corruption perceptions respondents are 5.4 pp less likely to show positive expectations.

The results related to financial literacy measures (interest rate knowledge and inflation knowledge) reveal a more optimistic perspective: respondents with high financial literacy are more likely to show positive public debt expectations. While both measures of financial literacy are significant, knowledge about the interest rate has higher positive effects on expectations than knowledge about inflation. This result is encouraging indicating a certain level of knowledge coherence among the respondents: respondents with higher levels of financial literacy may understand the causal relationship between economic growth, public debt, and interest rates.

Strong candidates for the factors that should affect public debt expectations are variables related to the capacity of the government to conduct efficient public spending and efficient resource redistribution. In Spec. 2 and Spec. 3., we control for trust in government and corruption perceptions. The results show consistent patterns across all specifications. On the demand side, public spending including spending through debt reflects voters' trust or mistrust in incumbents and their capacity to manage resources which, in turn, may be reflected through expectations. Indeed, individuals displaying higher levels of trust are more likely to show positive expectations than individuals showing lower levels of trust. In addition, considering region-specific characteristics related to government action transparency, we control for corruption perceptions. The results are in line with the expectations: individuals who believe the government is more corrupt are less likely to have positive expectations.

Concerning the effect of socio-demographic characteristics on public debt expectations, the results reflect a tendency for pessimism: individuals with higher incomes and

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employed are less likely to form positive expectations about public debt. In contrast, female respondents are more optimistic showing a higher likelihood of having positive expectations.

Table 1. Public debt knowledge and expectations

	Public debt expectations				
	(1)	**(2)**	**(3)**	**(4) Interested in economics**	**(5) Interested in politics**
Public debt knowledge	-0.093*** (0.016)	-0.066*** (0.015)	-0.054 (0.015)	-0.058*** (0.020)	-0.039* (0.024)
Inflation knowledge	0.005*** (0.013)	0.003*** (0.012)	0.003*** (0.012)	-0.006 (0.016)	0.008 (0.020)
Interest rate knowledge	0.040*** (0.013)	0.034*** (0.012)	0.020** (0.012)	0.030*** (0.015)	0.008 (0.021)
High trust		0.164*** (0.013)	0.139*** (0.013)	0.134*** (0.016)	0.165*** (0.023)
Low trust		-0.109*** (0.016)	-0.072*** (0.016)	-0.083*** (0.021)	-0.053*** (0.026)
Corruption perception			-0.122*** (0.011)	-0.116*** (0.015)	-0.127*** (0.016)
Age	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)
Education low	-0.019 (0.022)	0.010 (0.022)	0.019 (0.021)	-0.006 (0.025)	0.069 (0.040)
Education high	0.014 (0.016)	0.013 (0.015)	0.015 (0.015)	-0.032* (0.022)	0.011 (0.024)
Employed	-0.037*** (0.014)	-0.032*** (0.013)	-0.028*** (0.013)	-0.032 (0.017)	-0.007 (0.022)
Female	0.025** (0.012)	0.028** (0.012)	0.030** (0.011)	0.021 (0.017)	0.033 (0.020)
Manages HH finances	-0.018 (0.013)	-0.007 (0.012)	0.003 (0.012)	0.017 (0.016)	-0.014 (0.021)
With children	0.016 (0.014)	0.027*** (0.013)	0.025*** (0.013)	0.028 (0.017)	0.007 (0.023)
Income high	-0.092*** (0.022)	-0.073*** (0.021)	-0.074*** (0.020)	-0.091*** (0.028)	-0.074 (0.033)
Income low	0.037** (0.020)	0.028 (0.019)	0.014 (0.019)	0.023 (0.025)	-0.004 (0.034)
Income: no answer	-0.031*** (0.015)	-0.013 (0.014)	-0.014 (0.014)	-0.018 (0.019)	-0.013 (0.024)
Log-L	-4261.22	-4058.16	-3947.365	-2365.405	-1379.538
N	5988	5988	5988	3602	2037
Nagelkerke's R2	0.0413	0.1241	0.1670	0.1562	0.1825

Note: The presented results are the average marginal effects of an ordered probit model. The dependent variable "public debt expectations" takes three values (negative, moderate, positive). Standard errors are presented in parentheses;,** , and *** denote statistical significance at the 10%, 5%, and 1% confidence levels.*

Source: own processing

Although estimates in Table 2 (Spec. 1, Spec.2, and Spec.3) are to a large extent in line with previous findings about the role of information provision in shifting expectations, omitted variables ask for further clarifications. One could argue that individual interest in economic and political issue may have a direct effect on public debt expectations regardless of acquired knowledge or that this specific interest drive expectations through knowledge. To mitigate these concerns, we restrict the sample to individuals who have an interest in economics and politics. Spec.4 and Spec.5 confirm our previous results. For individuals interested in economics, inflation knowledge does not yield any significant

results on public debt expectations, while knowing the public debt size still decreases the chances of holding positive expectations. For individuals interested in politics, we do not see any significant results for the financial literacy measures, but the public debt knowledge is still negatively correlated with positive expectations.

A predictable question to ask is whether the estimates for public debt knowledge are the result of financial literacy or the result determined by the other factors influencing public debt expectations. One could argue that public debt knowledge results following increased financial knowledge. Table 3 (Spec. 1 and 3) restricts the sample to respondents who answer understand the concepts of inflation and interest rate. The results indicate that the degree of public debt knowledge remains significant across samples supporting the hypothesis regarding information provision. Moreover, higher or lower levels of trust/ corruption in government could weigh more than other public debt knowledge for forming a certain type of expectation. In the following four specifications, we test whether public debt knowledge remains an important factor in determining expectations. We confirm our results: for those individuals with low trust, public debt knowledge decreases the likelihood of positive expectations by 8.1 pp, while for those who show high political trust by only 4.2 pp. The results are similar in all specifications except for individuals perceiving corruption levels as being low.

These results show the effects of information provision on public debt expectations. Across all model specifications, public debt knowledge has a negative significant influence over expectations which may have a series of harmful consequences on individual or collective behavior. The high correlation between public debt knowledge and financial literacy measures provides a reference point for policy recommendations that should be aimed at increasing economic knowledge, not only skills and cocompetencies or money management.

Table 2. The contribution of public debt knowledge

	Public debt expectations					
	(1) IR literate	**(2) Inflation literate**	**(3) Low trust**	**(4) High trust**	**(5) High corruption**	**(6) Low corruption**
Public debt knowledge	-0.071*** (0.018)	-0.0564*** (0.019)	-0.081*** (0.030)	-0.042** (0.021)	-0.071*** (0.017)	0.04 (0.041)
Inflation knowledge	0.0014 (0.015)		0.061** (0.025)	-0.017 (0.016)	-0.001 (0.013)	0.002 (0.036)
Interest rate knowledge		0.018 (0.017)	-0.041 (0.026)	0.0604*** (0.015)	0.024* (0.013)	-0.059 (0.035)
High trust	0.158*** (0.016)	0.140*** (0.027)			0.1339*** (0.015)	0.143** (0.056)
Low trust	-0.077*** (0.020)	-0.044** (0.027)			-0.0872*** (0.020)	-0.0153 (0.043)
Corruption perception	-0.122*** (0.014)	-0.129*** (0.015)	-0.1129*** (0.014)	-0.120*** (0.023)		
Age	0.0002 (0.001)	-0.000 (0.001)	-0.0002 (0.001)	0.000 (0.001)	-0.0001 (0.001)	0.008 (0.001)
Education low	-0.010 (0.030)	0.016 (0.031)	0.0541 (0.043)	-0.056 (0.030)	-0.0336 (0.024)	0.153** (0.064)
Education high	0.019 (0.018)	0.028 (0.020)	0.0196 (0.031)	0.012 (0.019)	0.0104 (0.017)	0.0467 (0.043)
Employed	-0.016 (0.016)	-0.013 (0.018)	-0.0554 (0.027)	-0.020 (0.016)	-0.028 (0.015)	0.017 (0.039)
Female	0.025*	0.026*	0.0055	0.041**	0.0283**	0.0214

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	(0.014)	(0.016)	(0.025)	(0.015)	(0.013)	(0.035)
Manages HH finances	-0.002 (0.015)	0.014 (0.017)	0.0016 (0.026)	0.016 (0.016)	0.0025 (0.014)	0.0659 (0.038)
With children	0.008 (0.016)	0.027 (0.018)	0.036 (0.028)	0.029 (0.016)	0.0138 (0.014)	0.0495 (0.041)
Income high dependents	-0.096*** (0.026)	-0.103*** (0.027)	-0.1079*** (0.042)	-0.048* (0.027)	-0.069*** (0.024)	-0.112** (0.056)
Income low	0.019 (0.024)	-0.002) (0.027)	0.0483 (0.044)	0.0368 (0.023)	0.0196 (0.021)	-0.0672 (0.062)
Income: no answer	-0.037** (0.018)	-0.047** (0.020)	-0.0257 (0.030)	0.009 (0.017)	-0.027 (0.017)	-0.0075 (0.041)
Log-L	-2288.203	-2083.879	-1209.423	-1618.022	-2719.097	-577.3163
N	3630	3166	1494	2973	4507	673
Nagelkerke's R2	0.1896	0.1585	0.0871	0.1057	0.1047	0.0796

Note: The presented results are the average marginal effects of an ordered probit model. The dependent variable "public debt expectations" takes three values (negative, moderate, positive). Standard errors are presented in parentheses;,** , and *** denote statistical significance at the 10%, 5%, and 1% confidence levels.*

Source: own processing

Robustness

Several robustness estimations were conducted. First, instead of applying a three-category dependent variable for public debt expectations (1/3), we estimate a linear model where the dependent variable ranges from 1 to 6 (1 if the respondent strongly agrees and 6 if the respondent strongly disagrees with the statement). Again, we find the same negative effects of public debt knowledge on expectations. Second, one main concern is that the correlation between public debt knowledge and expectations is affected by the degree of subjective satisfaction of each respondent. The sub-sample robustness check confirms the results regardless of the satisfaction level. Additionally, since country-specific institutional and economic factors may be an important factor in determining public debt expectations, we estimate our probit models through resampling excluding one country at a time. As expected, even in smaller samples the results' patterns hold. Neither of these three model extensions presented in Appendix C does not affect our results.

Conclusions

The role of subjective beliefs and expectations in predicting economic policy outcomes has been intensively studied during the last decade. We shed light on how economic knowledge influences specific macroeconomic expectations about public debt. More generally, we examine the factors influencing individual expectations and what policy actions are necessary to shift individual behavior when there is a mismatch between the objectives of fiscal policies and behavior dynamics. First, we document that knowledge about public debt is positively correlated to financial literacy. Intuitively, individuals who have higher levels of financial literacy are more able to understand the causal links in economic activity.

Second, we find that the public debt knowledge or the awareness an individual has over the size of public debt in his/ her country increases the chances of having negative expectations about public debt. Contrary, financial literacy increases the chances of forming positive expectations. In other words, if an individual understands inflation and interest rates, he/she tends to be more optimistic about public debt, but not if he/she

knows the actual level of public debt. The results indicate an insufficiency of economic knowledge and a lack of understanding of key economic concepts.

Finally, political trust and corruption measures are associated with abnormal economic behavior such as tax avoidance or the lack of support for public good provision which results in undesirable macroeconomic outcomes. We test how these measures impact expectations about public debt. The level of optimism or negativism towards public debt may reflect reorientations for taxation expectations. We find results in line with previous findings: low levels of trust and increased corruption perception levels increase the chances of forming negative expectations. While it may be difficult to shift trust perceptions, economic knowledge has the potential to mediate the relationship between political trust and negative expectations.

As studies assess how voters change their perceptions about the incumbents based on the state of the economy at a certain point in time, further research should improve measures of economic knowledge which are generally omitted in explaining results of economic voting (Alesina et al., 2013; Duch & Stevenson, 2008; Lewis-Beck et al., 2013; Loveless & Binelli, 2020). The general assumption is that the level of knowledge and information voters receive is homogeneous, but there are wide differences in what individuals know and how they use economic knowledge in their reasoning.

The major contribution of this paper is that it provides robust evidence that specific economic knowledge has statistically significant effects on macroeconomic expectations. Contrary to other more general approaches which show that individuals with more economic knowledge tend to be more optimistic about the evolution of the economy (Walstad & Rebeck, 2002), the case of public debt expectations shows the reverse. However, the results are encouraging it could be worthwhile to focus on a variety of policies that include financial literacy instruments (education policy, employee training policy, social policy) to increase the level of awareness regarding public debt but include macroeconomics concepts within the curricula.

As information provision has a direct effect on forming expectations, the design of financial literacy programs could benefit from insights into macroeconomics. Improving individuals' capacity to understand macroeconomics has the potential to influence expectations and shift behaviors toward desired policy outcomes. As one of the main limitations of this study is related to constraints on data availability, the functional relationships between public debt knowledge and expectations may change when other factors are added or taken into account. A more focused approach to direct causality between knowledge and expectations will be beneficial for future research.

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Appendix A: Variable definitions and measurements

Variable name	Measure
Public debt expectations	Categorical variable taking three different values: "positive", "moderate", "negative". The variable is based on the four different questions: 1. "Higher public debt levels imply that I will have to pay more taxes in the future." 2. "Higher public debt levels imply that I will receive lower state pensions and/or lower welfare benefits in the future." 3. "The expected future development of public debt is worrisome." 4. "Public debt will increase strongly over the next 10 years." All questions are based on 6 points Likert scales. The final value of the variable is computed for each respondent as an average for all four questions.
Public debt knowledge	Dummy variable which takes the value one if the respondent correctly responded to the following question: "It is common to express public debt as a percentage of gross domestic product (GDP), in other words, as a percentage of what is produced or earned in a country per year. Currently, how high is this percentage in your country?" The answers are based on intervals. Thus, the respondent does not need to know the exact debt/ GDP ratio.
Interest rate knowledge	Dummy variable which takes the value one if the respondent correctly responded to the following question: "Suppose you had 100 € in a savings account and the interest rate was 2% per year. Disregarding any bank fees, how much do you think you would have in the account after 5 years if you left the money to grow: more than 102, exactly 102, less than 102?"
Inflation knowledge	Dummy variable which takes the value one if the respondent correctly responded to the following question: Suppose that the interest rate on your savings account was 4% per year and inflation was 5% per year. Disregarding any bank fees – after 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?
Past debt evolution awareness	Dummy variable that takes the value of one if the respondent correctly answered the following questions: "Public debt has increased strongly in over the past 10 years (i.e. since the outbreak of the global financial crisis in 2008/2009)"
Economics interest	Dummy variable equal to one if respondent states having an interest in economics. The variable is based on the following question: "I am very interested in economic questions."
Politics interest	Dummy variable equal to one if respondent states having an interest in politics. The variable is based on the following question: "I am very interested in politics."
Trust (high, medium, low)	Dummy variables are based on the following question (5 points Likert scale question) "How much you trust the government/cabinet of ministers"? Omitted category: medium trust.
Corruption perceptions	Categorical variable taking three different values: "high", "moderate", "low" assessing the degree of respondents' perceptions on corruption. The questions allow the respondents to agree/ disagree with the left/ right statement from the following two question: 1. "The state manages tax revenues conscientiously vs. is wasting taxpayer money." 2. "Most politicians act in line with the general public's interest vs. serve the interests of particular groups." All questions are based on 5 points Likert scales. The final value of the variable is computed for each respondent as an average for all four questions.
Subjective satisfaction	Dummy variable which takes the value of one if the respondent declared a high level of satisfaction answering the following question: "All things considered, I am satisfied with my life now".
Age	The age of the respondent.
Education (low, medium, high)	Dummy variables assessing the degree of education of each respondent (primary education level, secondary education level, primary education level). Omitted category: education medium
Employed	Dummy variable equal to one if respondent is employed, zero otherwise.
Female	Dummy variable equal to one if respondent is female, zero otherwise.
Manages HH finances	Dummy variable equal to one if respondent is in charge of managing household finances, zero otherwise.
Parent	Dummy variable equal to one if respondent has children, zero otherwise.
Income (high, medium, low, no answer)	Dummy variables which take value one for each net household income terciles (high, medium, low). For those respondents who did not give an answer an additional dummy variable is defined (refused income). Omitted category: income low

Appendix B: Descriptive Statistics

	Min/ Max	All countries	Bulgaria	Croatia	Poland	Romania	Czech Republic	Hungary
Public debt expectations	1/3	1.36	1.20	1.25	1.36	1.17	1.66	1.52
		(0.53)	(0.43)	(0.45)	(0.51)	(0.41)	(0.57)	(0.57)
Public debt knowledge	0/1	0.18	0.14	0.13	0.23	0.12	0.28	0.16
		(0.38)	(0.35)	(0.33)	(0.42)	(0.33)	(0.45)	(0.37)
Interest rate knowledge	0/1	0.53	0.44	0.72	0.60	0.35	0.62	0.43
		(0.50)	(0.50)	(0.45)	(0.49)	(0.48)	(0.49)	(0.50)
Inflation knowledge	0/1	0.60	0.74	0.60	0.50	0.55	0.68	0.56
		(0.49)	(0.44)	(0.49)	(0.50)	(0.50)	(0.47)	(0.50)
Past debt evolution awareness	0/1	0.84	0.91	0.93	0.83	0.96	0.73	0.70
		(0.36)	(0.29)	(0.25)	(0.38)	(0.20)	(0.45)	(0.46)
Economics interest	0/1	0.40	0.39	0.39	0.38	0.53	0.32	0.41
		(0.49)	(0.49)	(0.49)	(0.49)	(0.50)	(0.47)	(0.49)
Politics interest	0/1	0.34	0.36	0.33	0.37	0.32	0.30	0.35
		(0.47)	(0.48)	(0.47)	(0.48)	(0.47)	(0.46)	(0.48)
High level of trust	0/1	0.50	0.59	0.63	0.42	0.70	0.32	0.33
		(0.50)	(0.49)	(0.48)	(0.49)	(0.46)	(0.47)	(0.470
Low level of trust	0/1	0.25	0.22	0.13	0.30	0.15	0.36	0.34
		(0.43)	(0.41)	(0.33)	(0.46)	(0.35)	(0.48)	(0.47)
Corruption perception	1/3	1.36	1.19	1.25	1.51	1.17	1.50	1.54
		(0.67)	(0.52)	(0.57)	(0.76)	(0.47)	(0.75)	(0.79)
Subjective satisfaction	0/1	0.68	0.63	0.71	0.67	0.71	0.73	0.65
		(0.47)	(0.48)	(0.45)	(0.47)	(0.45)	(0.45)	(0.48)
Age	18/88	46.84	49.84	44.08	45.88	46.29	47.69	47.27
		(16.17)	(15.63)	(15.35)	(17.55)	(16.04)	(17.17)	(14.51)
Education low	0/1	0.09	0.02	0.07	0.24	0.02	0.06	0.11
		(0.28)	(0.13)	(0.26)	(0.42)	(0.15)	(0.24)	(0.31)
Education high	0/1	0.18	0.26	0.21	0.17	0.21	0.13	0.12
		(0.39)	(0.44)	(0.40)	(0.38)	(0.41)	(0.34)	(0.33)
Employed	0/1	0.57	0.52	0.56	0.51	0.51	0.63	0.68
		(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.48)	(0.47)
Female	0/1	0.54	0.54	0.56	0.52	0.55	0.50	0.57
		(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Manages HH finances	0/1	0.41	0.30	0.34	0.40	0.44	0.38	0.58
		(0.49)	(0.46)	(0.47)	(0.49)	(0.50)	(0.48)	(0.49)
Parent	0/1	0.32	0.30	0.31	0.37	0.31	0.37	0.29
		(0.47)	(0.46)	(0.46)	(0.48)	(0.46)	(0.48)	(0.45)
Income low	0/1	0.11	0.09	0.10	0.12	0.11	0.12	0.15
		(0.32)	(0.28)	(0.30)	(0.32)	(0.31)	(0.33)	(0.36)
Income high	0/1	0.17	0.19	0.22	0.12	0.24	0.12	0.11
		(0.37)	(0.39)	(0.41)	(0.33)	(0.43)	(0.32)	(0.31)

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Appendix C: Supplemental robustness checks

Dependent variable	Public debt expectations (1/6)	Public debt expectations (1/3)							
		High life satisfaction	Low life satisfaction	Excl. Bulgaria	Excl. Croatia	Excl. Poland	Excl. Czech Republic	Excl. Romania	Excl. Hungary
Public debt knowledge	-0.0447***	-0.048***	-0.064**	-0.040**	-0.054***	-0.060***	-0.013***	-0.053***	-0.086***
	(0.012)	(0.015)	(0.021)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Interest rate knowledge	-0.0096	-0.007	0.019	0.009	-0.020	-0.005	0.039	0.021	0.023*
	(0.010)	(0.014)	(0.020)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)
Inflation knowledge	0.0309	-0.029**	-0.064***	0.006	0.002	0.032*	0.042***	0.025*	0.017
	(0.010)	(0.015)	(0.021)	(0.013)	(0.013)	(0.013)	(0.012)	(0.014)	(0.014)
High trust	0.1785***	0.150***	0.117***	0.143***	0.167***	0.153***	0.112***	0.132***	0.112***
	(0.015)	(0.016)	(0.022)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.017)
Low trust	-0.0489***	-0.080***	-0.051*	-0.074***	-0.069***	-0.071***	-0.083***	-0.079***	-0.054***
	(0.013)	(0.018)	(0.030)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Corruption perception	-0.1133***	-0.123***	-0.118***	-0.125***	-0.105***	-0.131***	-0.122***	-0.120***	-0.120***
	(0.007)	(0.013)	(0.021)	(0.011)	(0.011)	(0.012)	(0.013)	(0.011)	(0.013)
Age	0.0002	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
	(0.000)	(0.027)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Education low	-0.012	0.029	0.005	0.038	0.017	0.036	-0.011	0.040	-0.002
	(0.017)	(0.017)	(0.032)	(0.022)	(0.023)	(0.016)	(0.021)	(0.023)	(0.023)
Education high	0.018	0.010	0.035	0.005	0.024	0.016	-0.010	0.020	0.022
	(0.013)	(0.017)	(0.030)	(0.017)	(0.017)	(0.016)	(0.015)	(0.017)	(0.016)
Employed	-0.0022	-0.021	-0.030	-0.034	-0.029	-0.027	-0.021	-0.022	-0.025
	(0.010)	(0.016)	(0.024)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Female	0.0183*	0.029*	0.029	0.028	0.025	0.036**	0.027*	0.029	0.033*
	(0.010)	(0.014)	(0.020)	(0.013)	(0.013)	(0.012)	(0.012)	(0.013)	(0.012)
Manages HH finances	-0.0088	0.013	-0.028	0.018	-0.002	0.000	-0.014	0.000	0.020
	(0.010)	(0.015)	(0.022)	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)
With children	0.0113	0.030	0.015	0.021	0.016	0.021	0.033	0.031	0.027
	(0.011)	(0.015)	(0.024)	(0.014)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)
Income high	-0.0672***	-0.086***	-0.074*	-0.082**	-0.062***	-0.080***	-0.069***	-0.070***	-0.069***
	(0.016)	(0.024)	(0.040)	(0.022)	(0.022)	(0.022)	(0.021)	(0.023)	(0.023)
Income low	0.0181	-0.008	0.068*	-0.001	0.029	0.019	0.013	0.017	0.002
	(0.016)	(0.025)	(0.029)	(0.021)	(0.020)	(0.020)	(0.019)	(0.022)	(0.020)
Income: no answer	-0.0167	-0.051***	0.070***	-0.042*	0.009	-0.005	0.003	-0.020	-0.015
	(0.011)	(0.018)	(0.023)	(0.016)	(0.015)	(0.015)	(0.015)	(0.016)	(0.015)
Log-L	-7046.3	-2680.4	-1230.9	-3420.2	-3377.9	-3253.7	-2963.3	-3458.2	-3174.0
N	5988	4099	1911	4998	4981	4997	5035	5024	5035
Nagelkerke's R2	0.1853	0.1740	0.1901	0.1654	0.17362	0.1843	0.1839	0.1519	0.1519