STOCK MARKET PARTICIPATION PUZZLE IN EMERGING ECONOMIES: THE CASE OF LITHUANIA

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Abstract. *We examine underlying factors that explain an exceptionally low stock market participation rate among Lithuanian households by carrying out a comprehensive survey of mass affluent individuals. The probit regression analysis of the survey results indicates that lack of financial literacy, low risk tolerance and lack of trust in financial institutions are the three key factors explaining the stock market participation puzzle in Lithuania, while high investment fees, high stock market return expectations or underdeveloped local capital markets do not have a significant effect. The paper also examines whether the same factors also have influence on investment fund, bond and real estate market participation rates. Interestingly, lack of financial literacy, low risk tolerance, lack of trust in financial institutions and high stock market return expectations increase household participation rate in real estate market. The latter finding should be of particular interest to macro-prudential policy makers as increasing financial literacy of households and increasing trust in financial intermediaries would likely cause higher stock market participation at the expense of investments in local real estate market thus not only improving household portfolio diversification and liquidity, but also potentially mitigating local real estate boom and bust cycles.*

Key words: stock market participation puzzle, trust, financial literacy, risk tolerance, real estate

JEL Classification: G02, G11, G14, G15, G18

Introduction

Global stock market is experiencing a strong post-crisis recovery with FTSE All World Index standing at all-time record high levels following an impressive 150% increase since 2009. Investment fund industry is also experiencing a post-crisis boom with

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record-high sales of investment funds recorded in Europe in 2015 (EFAMA, 2015). However, despite an impressive stock market performance in recent years and ample evidence that in the long-term investments in stocks earn positive equity premium (Mehra & Prescott, 2003), only a small fraction of households in emerging economies in general, and Lithuania – in particular, invest directly in stock market or hold investment units with investment funds. Instead, households prefer holding their savings in cash or low-interest-earning bank deposits.

Low stock market participation rate not only translates into slower wealth accumulation and loss of purchasing power for households, but also brings great challenges to financial service industry in general and investment management industry in particular. During the last seven years net worth of Lithuanian households almost doubled rising from EUR 14.0 billion in 2009 to EUR 24.7 billion in 2016 (ECB, 2016). Yet, majority of this wealth is being held in cash and bank deposits or invested in real estate (other than household main residence, henceforth: HMR) with only a small fraction invested in stocks, investment funds[1] or other financial assets.

This inhibits the development of the modern financial system and limits the efficient allocation of capital. Nevertheless, it also signals great opportunity: if stock market participation rate were to converge to the eurozone-average levels, the potential for financial service industry growth would be substantial. However, to make reasonable predictions one needs to identify underlying factors causing low stock market participation.

TABLE 1. **Household participation rate in financial assets and in real estate**

	Deposits	Investment funds	Stocks	Bonds	Real estate (other than HMR)
Euro zone average	96.9	9.4	8.8	4.6	24.1
Lithuania*	53.8	1.3	1.3	0.8	36.0
Latvia	78.5	0.1	0.8	0.3	39.1
Estonia	98.6	3.2	3.6	0.1	32.0
Poland	82.8	4.2	3.5	1.0	18.9
Slovakia	88.2	2.0	2.1	0.3	19.4
Slovenia	93.3	5.6	8.0	0.7	30.6
Hungary	81.1	7.4	1.3	7.3	23.0

Source: The Household Finance and Consumption Survey: results from the second wave (ECB, 2016)

* Lithuania was not included in the survey, hence data (not fully comparable) is presented from the Survey of the Financial Behaviour of Households (Bank of Lithuania, 2016)

A number of attempts have been made to explain an observed phenomenon of household underinvestment in stock market. Yet, to this date, there is no common agreement as to which factors best explain this phenomenon and hence to this day it still remains a puzzle colloquially called "the stock market participation puzzle" (Mankiw & Zeldes,

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[1] In Lithuania assets under management per capita are the lowest in the Eurozone – more than 200 times lower than the Eurozone average (Bank of Lithuania, 2016)

1991). In addition, previous research mainly focused on explaining the phenomenon in developed countries and, to the authors' knowledge, there have not been a comprehensive research carried out to examine the stock market participation puzzle in Lithuania and other Baltic States.

The case of Lithuania (and Baltic states in general) is of general interest due to the following reasons:

1. Lithuanian households have substantially lower stock market participation rate compared to the Eurozone average.
2. Lithuanian households also have substantially lower investment fund and bond market participation rates compared to the Eurozone average.
3. Yet, real estate participation rate (other than HMR) of Lithuanian households is higher than the Eurozone average.
4. Similar tendencies are observed in other Baltic and CEE Europe countries, suggesting that findings about Lithuanian households could be generalized more broadly.

The paper attempts to fill the aforementioned gaps in the existing research and examine the key factors explaining exceptionally low stock market participation rate in Lithuania. The aim of the paper is to design and estimate an econometric model, explaining the stock market participation puzzle in Lithuania.

The key objectives of this paper are as follows. First, to perform an in-depth analysis of the existing literature examining the stock market participation puzzle phenomenon. Second, to identify key factors explaining the stock market participation puzzle. Third, to carry out an investor survey examining the impact of each of the identified explanatory factors. Fourth, to design and estimate the econometric model aimed at testing which factors explain the stock market participation puzzle in Lithuania. Fifth, to design and estimate the econometric model aimed at identifying factors explaining low participation rate in investment funds and bonds and high participation rate in the real estate market. Finally, to provide conclusions and recommendations for investment industry and policy makers both in Lithuania and CEE region overall.

The paper is structured as follows. *The first part* presents a concise overview of the current body of research aimed at explaining "the stock market participation puzzle". *The second part* presents results of investor survey carried out in Lithuania aimed at analyzing key factors explaining the "stock market participation puzzle" phenomenon. *The third part* presents key findings followed by discussion. Finally, conclusions are made and recommendations to increase stock market participation rate in Lithuania are provided.

1. Stock market participation puzzle

The canonical Portfolio Model (Markowitz, 1952) implies that all households should be holding some part of their investments in risky securities unless they are infinitely risk averse and/or expected equity risk premium is not present in the market (i.e. excess

return over the risk-free asset is zero or negative). However, empirical evidence suggests that in the long-term investments in stocks earn positive equity premium (Mehra & Prescott, 2003) and investors do not have unreasonably high level of risk aversion. And yet individuals are underinvesting in stocks in general and investment funds in particular (Guiso et al., 2003). This phenomenon is named as "the stock market participation puzzle" (Mankiw & Zeldes, 1991).

Lee et al. (2015) analysed the effect of investor's risk aversion and return expectations on stock market participation rate using the Dutch household survey data. They found, as expected, that higher risk aversion, ceteris paribus, decreases participation in stock markets, while higher return expectations, ceteris paribus, have positive effect on stock market participation. They also analysed the joint effect of the two factors and found that higher risk aversion is related to lower return expectations. Hurd et al. (2009) also found a positive relationship between return expectations and stock market participation, while Arrondel et al. (2014) discovered that stock market participation positively correlates not only with investor's information about expected returns, but also with past realized returns. These findings are in line with the Modern Portfolio Theory, but these factors alone are unable to explain the puzzle.

Hence, there is a body of literature analysing other factors which affect stock market participation. Dimmock (2005) analysed the effect of loss aversion (Kahneman & Tversky, 1979) instead of risk aversion and found that loss aversion has a very strong negative effect on stock market participation, but not as strong on investment fund market participation. Lee and Veld-Merkoulova (2016) analysed the effect of myopic loss aversion (i.e. aversion of short-term losses) and found significant negative relationship with stock market participation. Cao et al. (2005) suggest that uncertainty dispersion among investors may explain low stock market participation rate, while Ang et al. (2005) use the concept of disappointment aversion proposed by Gul (1991) to test stock market participation and find a positive relationship.

Another body of research analyses the effect of financial literacy on stock market participation. Since investing in stock market involves judgement, investors are more willing to make them once they have or they feel that they have the needed investment knowledge (Heath & Tversky, 1991). For example, Van Rooij et al. (2011) used the Dutch Household Survey data to find a significant positive relationship between stock market participation and financial literacy. Using the data from Finland, Grinblatt et al. (2011) found that high-IQ individuals are more likely to invest in stocks and mutual funds and earn higher returns. Xia et al. (2014) proposed an idea that it is not financial literacy *per se*, but rather financial literacy overconfidence that increases stock market participation. The authors found a positive relationship between overconfidence and stock market investment using data of the Chinese Survey of Consumer Finance. Similarly, Grinblatt and Keloharju (2009) discovered that overconfidence and sensation seeking increases stock market participation.

Von Gaudecker (2015) analysed the link between financial literacy and portfolio diversification using the Dutch household data. The research revealed that households with financial literacy below median and not using professional financial advice tend to under-diversify their portfolios, which results in lower long-term returns. Similarly, Guiso and Jappelli (2005) used the data from the Bank of Italy Surveys of Household Income and Wealth and found that lack of awareness about opportunities to invest in stocks and investment funds limits participation rate.

Another important factor encouraging stock market participation is household wealth (Guiso et al., 2003). The Eurosystem household finance and consumption surveys (ECB, 2013, ECB 2016) indicates that income, net wealth and education have significant effect on stock market participation. As much as 23.1% of households in the upper net wealth percentile invest in stocks compared to a mere 0.7% of households in the lowest percentile. Vestman (2010) analyzed the data for the USA and Sweden and showed that home owners have higher stock market participation rate than renters. Likewise, 17.9% of respondents having tertiary education invest in stock market compared to a mere 3.2% with basic education. Stock participation increases gradually with age, with 16–34-year-olds having twice lower stock market participation compared to 45–74-year-olds. However, older people are generally wealthier, hence when controlled for wealth level, the age factor is generally found to be insignificant (Fujuki et al., 2012). Briggs et al. (2015) analysed the effect of wealth on stock market participation using the database of Swedish lottery-winners. The authors found a positive relationship between stock market participation and winning the lottery (i.e. the winners who had not participated, started participating).

A number of researchers examined the importance of trust factor on stock market development. Guiso et al. (2005) analysed the effect of trust on stock market participation. They found that trust factor explains the lack of stock market participation at the individual as well as the country-wide level. Specifically, they showed that lack of trust explains why certain wealthy US investors underinvest in stocks and why certain countries with lower trust (e.g. Italy) have lower level of stock market participation compared to those that have higher trust (e.g. Sweden or the USA). Similarly, (Asgharian et al., 2014) analysed the effect of institutional quality on trust and the effect of trust on stock market participation using the household level-data of 14 European countries (two CEE countries among them, namely Poland and Czech Republic). They identified a significant positive relationship between institutional quality and trust on the one hand, and trust and stock market participation on the other. Georgarakos and Pasini (2009) found that trust and sociability have strong and distinct effect on stock market participation (e.g. Italy and Spain are low trust countries). Giannetti and Wang (2015) showed that households from the USA states with more frequent cases of corporate fraud have lower stock market participation.

The usage of financial advisor services also proved to be increasing stock market participation (Georgarakos & Inderst, 2014) – especially among households with less financial knowledge, i.e. financial advisors compensate the lack of financial knowledge.

Fraile and Ehrmann (2014) examined the effect of macroeconomic experiences on households' willingness to take on risks and invest in stock market. The authors revealed that recent positive experiences (e.g. the period of bull market) correlated positively with willingness to participate in the stock market, while negative experiences (e.g. financial market crash) – respectively reduced the willingness.

Bogan (2008) demonstrated that the usage of internet has a positive effect on the stock market participation rate, while Glaser and Kloss (2013) found that this relationship holds only among financially literate households.

There is very little research done to analyse the relationship between stock-holding and holdings of other assets, or investments in real estate. Miguel (2013) found that stock-holding in Spanish households is positively correlated with holdings of safe financial assets (bonds) and negatively correlated with investments in real estate. Christelis et al. (2013) showed that differences in economic environment play an important role in explaining decomposition of household investments, with US households investing more in stocks and European households more in real estate.

Even fewer studies have been carried out about emerging markets due to lack of reliable data, interest or low relevance. Banyen and Nkuah (2015) analysed data for Ghana and found that stock market risk premium and investors' risk aversion alone are not able to explain exceptionally low stock market participation rate. The authors identified four additional factors that explain the stock market participation puzzle, namely awareness, trust, education and herding behaviour. Fouzia et al. (2012) found similar

TABLE 2. **The list of factors explaining the stock market participation puzzle**

Factor	Effect	References
Risk aversion of investor	Negative	Lee et al. (2015)
Return expectations	Positive	Hurd et al. (2009)
Loss aversion / myopic loss aversion of investor	Negative	Dimmock (2005), Lee & Veld-Merkoulova (2016)
Fixed entry costs	Negative	Naudon & Tapia (2004)
Financial literacy / Financial literacy overconfidence	Positive	Van Rooij et al. (2011) / Xia et al. (2014)
Usage of financial advisor	Positive	Georgarakos & Inderst (2014)
Awareness about and access to investment opportunities	Positive	Guiso & Jappelli (2005) and Kozak & Sosyura (2015)
Trust	Positive	Duarte et al. (2010), Guiso et al. (2005)
Negative macroeconomic experiences	Negative	Fraile & Ehrmann (2014)
Macroeconomic environment	Positive / negative	Christelis et al. (2013)
Household wealth	Positive	Briggs et al. (2015)
Holdings of safe financial assets	Positive	Miguel (2013)
Investments in real estate	Negative	Miguel (2013)
Wealth/income inequality	Negative	Favilukis (2013)
IQ of an investor	Positive	Grinblatt et al. (2010)

factors in analysing low stock ownership in Pakistan, i.e., low awareness, financial literacy and social interaction as well as high informational, participation and entry costs.

Table 2 lists the key factors explaining the stock market participation puzzle together with the estimated effect.

Having reviewed the key factors explaining the stock market participation puzzle, the paper aims to answer the following questions. First, to test which of the aforementioned factors explain low stock market participation rate in Lithuania. Second, to test which of the aforementioned factors are also able to explain low investment fund and bond participation rate in Lithuania. Third, to test which of the aforementioned factors could explain high household investments in real estate in Lithuania.

2. Research Methods and Data

The primary objective of this part is to test which factors explain the stock market participation puzzle in Lithuania. Another objective is to test whether these factors could explain low household participation rate in investment funds and bonds (thereafter: financial assets) as well as relatively high participation rate in real estate. To achieve these aims, first a cross-sectional study using an online survey was carried out and then probit regressions following Guiso et al. (2003) for stock, investment fund, bond and real estate market participation were estimated. Descriptive analysis and two sample t-tests were used to assess unconditional effect of selected factors on household participation rate.

The survey was designed using *apklausos.lt* online survey platform and distributed to respondents via e-mail in order to increase convenience, reduce response time (an average time to take the survey was 7 minutes and 17 seconds) and increase response rate. The survey included the total of 18 survey questions, selected on the following two criteria: 1) general factors identified in previous research that might explain the "stock market participation puzzle" and 2) country-specific questions identified during pre-survey interviews with selected investment experts. For example, financial literacy of respondents was evaluated by asking a closed-end five-level Likert-type scale question "please assess your investment knowledge", while loss aversion was evaluated by asking a closed-end question with 21 possible answer options (would not tolerate any; up to 5%; up to 10%; up to 15% … up to 95%, up to 100%). Likewise, stock return expectations of respondents were evaluated by asking an open-ended question "what average annual return would you expect to earn by investing in <USA / euro zone> stock index over the next 10 years?"). Questions about participation in stocks, investment funds, bonds and real estate were asked using a dichotomous scale. The complete list of questions and their rating scales is provided in Table 7 in the Appendix.

The survey respondents were not selected from the population at large, but instead were selected from three sub-samples, representing wealthy individuals, having means and being able to invest, namely 1) clients of Nordea Markets Lithuania, 2) members

of Lithuanian Rotary clubs and 3) alumni of BMI Executive MBA. The first sub-sample primarily covers CEOs or CFOs of Large and Medium Lithuanian corporate companies, corporate clients of Nordea Bank Lithuania. The second sub-set of respondents primarily includes individuals having sufficient capacity to invest in investment or other investment products, and they generally represent older generation[2]. Finally, the third sub-set of respondents represents younger generation[3] with high earnings and high wealth-accumulation potential. Table 3 presents the concise description of the survey sample.

TABLE 3. **Survey sample description**

	Number of respondents	**Number of responses**	**Response rate**	**Time to answer (median, in sec.)**
Nordea Bank clients	104	38	37%	469
Rotary club members	171	35	20%	405
EMBA Alumni	83	41	49%	349
Total	358	114	32%	437

It was a deliberate decision not to include population at large in the sample in order to minimize non-response and participation biases, given that the survey questions include the sensitive ones about the personal financial situation, which are prone to be underreported. Such narrowing of the sample made it possible to exclude culturally sensitive questions about the level of income/wealth or most common lead questions (age, gender), which further increased the response rate. The target groups were chosen to ensure that the large majority of respondents belong to a mass affluent middle-aged household category and that a significant part of them do participate in stock and other markets. Indeed, the stock market participation rate among respondents was 31% as opposed to an estimated 1.3% for the population as a whole.

To the authors' knowledge, there have been no comparable surveys carried out in Lithuania and only a handful of related ones. Among these the so called "Survey of Lithuanian Investors" (Lith.: Lietuvos investuotojų tyrimas) was carried out by Synergy Finance (2013). However, the survey was aimed primarily at evaluating the rationality of investor behavior in general and not the financial market participation specifically. The Bank of Lithuania also periodically (bi-annually) carries out the Survey of the Financial Behaviour of Households (Bank of Lithuania, 2016), which focuses on saving and borrowing habits of Lithuanian households as well as self-assessment of financial position of Lithuanian households. It is also worth mentioning "The Eurosystem Household

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[2]   Minimum age to become a Rotary member is 30, with an average age ranging around 50–60 years.

[3]   Average age of the sub-sample is 30–40 years.

[3]   I also conducted several sensitivity analyses. For example, I replaced provincial level sub-indices of institutional quality with the aggregated index (PCI); or export was excluded. However, qualitatively similar results have been obtained in all cases, and they are available on request.

Finance and Consumption Survey" (ECB, 2013), which addresses some of the background questions, however, Lithuania and other Baltic States were not included in the survey.

Survey results were analyzed by building a probit regression model with response variable being defined as categorical dichotomous variable indicating 1 if a particular survey respondent invests in the asset in question (e.g. stock, investment fund, bond or real estate) and zero otherwise. Predictor variables (e.g. self-assessed financial literacy, risk tolerance, trust in financial intermediaries etc.) were normalized using quantile normalization technique (Amaratunga & Cabrera, 2001). The linear regression model was designed using backward stepwise regression algorithm by MATLAB Statistics and Machine Learning toolbox, which selected the best model by minimizing the Akaike Information Criteria (AIC), i.e. the model which has the lowest likelihood penalized for the number of parameters $AIC = 2k - 2ln(\hat{L})$, where:

k – the number of model parameters

$\hat{L}$ – maximized value of the likelihood function.

The model was also tested using more restrictive Bayesian Information Criteria (BIC), but in this case analogous results were obtained (except for one parameter in the model explaining stock market participation).

Additionally, two-sample t-tests were performed with the aim to test whether selected predictor variables have unconditional explanatory power in explaining factors influencing investment participation. Finally, interesting observations are provided using descriptive statistics.

3. Empirical Results and Discussion

The analysis of survey results revealed that in line with existing body of research *financial literacy (1)* and *risk tolerance of respondents (2)* have significant positive influence on stock market participation rate in Lithuania. The possible explanation is that the lack of investment knowledge raises uncertainty, which, in turn, discourages stock market participation, while higher risk aversion (i.e. lower risk tolerance) discourages investors from investing in risky securities. However, contrary to existing research, *stock market return expectations (3)* and *high investment fees (4)* factors are not significant in explaining stock market participation suggesting that higher expected returns (e.g., boom cycle) and lower management fees do not motivate investors to invest in stock market. This is to a large extent confirmed with post-crisis data, which indicated that post-crisis stock market recovery and proliferation of low-cost Exchange traded funds did not result in substantial increase in stock market participation in Lithuania. Nonetheless, the *usage of financial advisor services (5)* factor has significant positive effect on stock market participation in line with previous research, suggesting that investment advisory industry is an important element in encouraging higher stock market participation.

It is worth mentioning that *lack of trust in financial intermediaries (6)* has significant negative effect on stock market participation. Lack of trust is somewhat correlated (correlation coefficient: 0.3) with the *lessons learned during the 2008–2009 financial crisis (10)*, but presumably the primary reasons are recent shocks in Lithuanian financial industry. For example, now bankrupt bank SNORAS issued "deposit certificates" in 2012, which apparently were not insured by state deposit insurance scheme resulting in substantial losses for investors once the bank went underwater. Another notorious case is related to the sale of leveraged index-linked bonds by DnB bank during the pre-crisis period, which ended-up in long-lasting litigation processes and substantial losses for investors. Looking at the more distant past, Lithuania, just as other Baltic States, experienced full-fledged banking crisis in 1995–1996 following an initial transition step from planned to market economies.

Contrary to what might have been expected, *under-developed domestic capital market (8)* factor is not among the factors limiting stock market participation. On the contrary,

TABLE 4. **Summary of probit regression results**

Predictor variables \ Response variable	(A) Investing in stocks	(B) Investing in funds	(C) Investing in bonds	(A+B+C) Investing in financial assets	R-(A+B+C) Investing in real estate only
Financial literacy (self-assessed) (1)	0.3755*		1.0017**	0.76187**	-1.0433**
Risk tolerance (2)	0.81873**	0.67385**	0.34753**	0.72153**	-0.54023**
Stock market return expectations (3)			-0.18937*	-0.24539*	0.28743*
High investment fees (4)			-0.52521**		-0.26321*
Usage of financial advisor services (5)	0.13203*	0.30944**		0.16066*	
Lack of trust in financial intermediaries (6)	-0.52808**	-0.20157*	-0.22411*	-0.57078**	0.34271*
Lack of professionalism of financial intermediaries (7)	0.34573*			0.2852*	
Underdeveloped domestic capital market (8)	0.24216*	0.39513*	-0.31981*	0.33032*	-0.35699*
Overall economic insecurity increasing demand for safe-haven assets (9)		-0.44248**			
Lessons learned during the 2008-2009 financial crisis (10)***					
Intercept	-0.18972	-0.23779	-0.96511**	-0.08509	0.8448**
Equation adjusted r-square	0.442	0.399	0.312	0.501	0.437

Note: ** - significant at 0.01 level, * - significant at 0.1 level, *** - explanatory parameter found to be insignificant in all equations

investors who already do participate in stock markets reported this factor to be of bigger importance compared to those who do not invest, which suggests that it plays a minor role in influencing decision to participate in stock market in general. This may be explained by the fact that the majority of investments in Lithuania (as in other emerging economies) is being made overseas (USA, the euro zone, Russia), hence the development of the local market plays a minor role in decision to participate as such and probably more as a limiting factor for diversification opportunities. Likewise, *lack of professionalism of financial intermediaries (9)* is also being quoted more by those who already invest in stock markets compared to those who do not, suggesting that this factor does not play an important role in making decision whether to participate or not. Table 4 provides a concise summary of regression results, while correlation matrix among predictor variables is provided in the Appendix.

Analogous regression has been tested with *investment funds* and *bonds* taken as response variables. In the case of investment fund participation, most explanatory factors coincide with the ones explaining stock market participation. The noteworthy differences are that *financial literacy (1) per se* has been found not to be statistically significant. Instead, *the usage of financial advisor services (5)* predictor variable has been found more statistically significant. This suggests that investment fund participation rate (i.e. indirect stock market participation) can be augmented by encouraging the usage of financial advisor services. *Lack of trust (6)* has also been found to be a significant factor, but surprisingly, *overall economic insecurity (9)* has been found to be highly significant, suggesting that households opt not to participate in risky investment funds and instead choose safe-haven assets due to an overall economic insecurity. The latter finding could explain why lower participation rate is observed in emerging markets in general vis-à-vis developed ones with more stable macroeconomic environment. As in the case with stocks, underdevelopment of domestic market proved not to be a significant factor.

Low Financial literacy (1) and *lack of trust* (6) factors also explain low participation rate in bond market. However, there exist notable differences. First, high s*tock market return expectations (3)* limit investments in bond market, as confident investors presumably choose to invest in stocks and/or investment funds. Secondly, *high investment fees (4)* also limit investments in bonds, since presumably they are compared to other low-risk investment alternatives (deposits, cash) and fees become more visible in ultra-low interest rate environment. Thirdly, contrary to stocks and investment funds, *underdevelopment of domestic capital market (8)* has negative effect on bond market participation. This can be explained by the fact that significant part of investments in bond is made locally in government bills and bonds. It is interesting to note that *risk tolerance (2)* overall has a positive effect on bond market participation, which is counterintuitive and somewhat contradicts the negative effect of *stock market return expectations (3)* factor. Yet, given an overall lack of trust in financial intermediaries, investing in bonds is presumably perceived to be risky not only because of market or credit risk, but also because of significant counterparty risk.

Analogous regression was also tested taking participation in real estate only, i.e. those investors that invest in real estate, other than household main residence (HMR), but do not invest in stocks, investment funds or bonds (henceforth – financial assets). The findings are of particular interest for financial service industry and policy makers. Firstly, the lower *financial literacy (1)* and *risk tolerance (2)*, the more likely the investors are to invest in real estate, and not in financial assets. This indicates that less financially-savvy investors tend to overinvest in real estate, hence compromising diversification and liquidity of their portfolios. Additionally, more risk averse investors are more likely to invest in real estate, which indicates that they either underestimate the real riskiness of investment in the real estate or do not trust financial service industry in general. The latter hypothesis is to a large extent supported by the finding that *lack of trust in financial intermediaries (6)* leads to an increase of investments in real estate (and their decrease in financial assets). Secondly, investors having higher *stock market return expectations (3)* (which could be considered as proxy for high return expectations from investments in general) are more likely to invest in real estate, which should further increase investment in the real estate in the upturn phase of the economic cycle. Hence, in Lithuania and potentially other emerging European economies, post-crisis stock market recovery is likely not to increase stock, investment fund or bond market participation, but rather to increase investment flows into domestic real estate market. The latter observation is supported with the empirical data from all the three Baltic States experiencing rapid increase in housing market activity and prices in 2015 and 2016. *High investment fees (4)* and *underdevelopment of local capital market (8)* are the two reported factors limiting investments in real estate.

In order to get deeper insights on what motivates investors to invest in the aforementioned financial and real assets, the respondents were asked to rank the importance of factors influencing financial decisions. The probit regression results indicate that advice from financial advisor indeed has significant positive effect on indirect shareholding (i.e. investment in investment funds), but specialized sources have higher effect on decisions to invest in stocks and bonds (expert commentaries, on the contrary, appeared to have negative effect on stock market investment decisions). Overall, there is a clear dichotomy between investors investing in financial assets and real estate. The former in general rely on advice from financial advisors or specialized sources and do not base their investment decisions on general mass-media channels, while investors in real estate, on the contrary, tend to rely on information provided in mass media channels. This again supports the idea that real estate investment is more prone to herding behavior.

In addition to probit regressions, two sample two-sided t-tests were conducted for each response and predictor variables. For example, the null hypothesis of no relationship between financial literacy and market participation is strongly rejected as t-test statistics at the 5% significance level suggests that respondents investing in investment funds, stocks, bonds or any combination of these risky financial assets have significantly higher investment knowledge compared to those respondents that do not have invest-

TABLE 5. **Factors influencing investment decisions of survey respondents**

Predictor variables	(A) Investing in stocks	(B) Investing in funds	(C) Investing in bonds	(A+B+C) Investing in financial assets	R-(A+B+C) Investing in real estate only
Personal opinion / experience		0.12101 (0.0088156)			
Advice from friends / relatives			0.099162 (0.022995)		
Advice from financial advisor		0.12144 (0.00016712)		0.093933 (0.0069414)	-0.10476 (0.0026944)
Expert commentaries	-0.16294 (0.0020243)				
Specialized sources (e.g. Bloomberg)	0.15461 (1.8419e-05)		0.065217 (0.030557)	0.13123 (0.00013126)	-0.11394 (0.00081278)
Mass media channels		-0.11562 (0.0067636)	-0.10799 (0.0051076)	-0.13635 (0.0017317)	0.15632 (0.00035786)
Intuition*					
Intercept	*0.27171 (2.6063e-09)*	*0.089146 (0.11574)*	*0.1387 (0.0034459)*	*0.32304 (1.424e-08)*	*0.6413 (4.2223e-22)*

*Note: p-values are presented in parentheses * - factor not significant in all equations*

ments in the aforementioned financial instruments. This result is in line with the findings reported by Almenberg and Widmark (2011), Van Rooij et al. (2011) and others. In the case of investors investing only in real estate, the relationship is found to be opposite, i.e. lower financial literacy results in higher real estate investments. The results of two sample t-tests are provided in Table 6. The results with other response variables are provided in the Appendix.

TABLE 6. **Two sample t-test results: Financial literacy**

	Investing in the security	Number of respondents	Financial literacy (mean)	Variance	Test statistics	p-value
Investment funds	Yes	34	0.56	0.31	4.52	1.5181E-05
	No	80	-0.20	0.82		
Stocks	Yes	35	0.63	0.30	5.39	3.93742E-07
	No	79	-0.24	0.77		
Bonds	Yes	27	0.78	0.41	5.70	9.98434E-08
	No	87	-0.21	0.68		
Risky financial assets	Yes	55	0.55	0.40	7.29	4.57411E-11
	No	59	-0.46	0.67		
Real estate only	Yes	45	-0.58	0.70	-7.01	1.87393E-10
	No	69	0.42	0.45		

It is worth mentioning that overall economic insecurity and lack of trust in financial intermediaries were among the factors highly evaluated both among those who participate in stock market and among those who do not. This may imply that it is these factors that determine the relatively low stock market participation in Lithuania and other CEE and Baltic countries, which would be in line with the findings of Guiso et al. (2005), Asgharian et al. (2014) and Giannetti and Wang (2015). This merits further cross-country investigation to test the role of these factors in determining the overall low level of stock market participation. In addition, a large majority of survey respondents evaluated their financial literacy as medium, with Rotary and BMI sub-sample slightly below the average, suggesting that financial literacy is indeed an issue in Lithuania (one would presume that general population would have substantially lower financial literacy). Furthermore, risk tolerance of respondents is exceptionally low, with 65% of respondents indicating they would tolerate only up to 10% annual investment loss, and 17% responding that they would not tolerate any loss at all. There could be cultural and socio-economic factors behind this, which merits further investigation. Finally, stock return expectations over the next 10 year period appeared to be quite reasonable (8.5% for the broad USA stock index and 7.4% for the broad euro zone index) with those investing in stocks, funds and bonds being slightly more optimistic about the USA and slightly less optimistic about the euro zone. This, however, contradicts the existing research claims that return expectations have positive relationship with stock market participation. An explanation is that in the case of Lithuania (and possibly other emerging markets), despite high stock return expectations, investors do not participate in stock market due to the lack of trust in financial intermediaries, general macroeconomic instability and low risk tolerance.

Yet, an interesting observation is that investors not investing in any of the aforementioned risky financial assets, but investing in real estate (i.e. only real estate), have significantly lower investment knowledge compared to those investing in risky financial assets. This suggests that Lithuanian citizens may be choosing to invest in real estate not because of higher anticipated expected return or home bias phenomenon, but rather because of the lack of investment knowledge and lack of trust in financial intermediaries. Given that investment in the real estate lacks diversification and liquidity, and may also result in real estate bubbles, this finding should be of particular interest to macro-prudential policy makers as increasing financial literacy of citizens may mitigate real estate boom and bust cycles.

Conclusions and recommendations

Stock market participation rate in Lithuania as well as in other Baltic and CEE countries is low compared to Western European levels as households prefer keeping their savings in cash and low-earning deposits or investing in domestic real estate market. This not only limits long-term wealth accumulation of households, but also inhibits develop-

ment of domestic financial service sector. Hence, it is of crucial importance to identify the underlying factors that are capable of explaining the so-called stock market participation puzzle. Being aware of these factors, appropriate policies could be designed by government agencies and financial sector players to increase the stock market participation among households in Lithuania and elsewhere in the Baltic and CEE region.

The paper finds that lack of financial literacy, low risk tolerance and lack of trust in financial institutions are the three key factors explaining low stock market participation rate among Lithuanian households. It is noteworthy that exactly these three factors explain high household participation rate in local real estate market, which should be of particular interest to macro-prudential policy makers as increasing financial literacy of households and increasing trust in financial intermediaries would likely cause higher stock market participation at the expense of investments in local real estate market thus not only improving household portfolio diversification and liquidity, but also potentially mitigating local real estate boom and bust cycles.

The latter statement is supported by the finding that households' stock market return expectations do not have a significant effect on direct or indirect (via investment funds) stock market participation. However, higher return expectations increase participation rate in domestic real estate investments. Thus, upturn in global stock market indices would coincide not with higher investment flows into risky financial assets, but rather into local real estate market. Another finding is that the usage of financial advisor increases direct and indirect stock market participation rate – especially among less financially savvy households. Thus, the role of financial advisors should not be disregarded, and efforts should be put to increase credibility and trust of financial advisory service providers.

Finally, it is worth mentioning that Lithuanian households have very low risk tolerance and high distrust in financial intermediaries, which may explain why an overall level of stock market participation in Lithuania is among the lowest in Europe. These findings warrant a more in-depth pan-European cross-country study on the determinants of low stock market participation.

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Appendix

TABLE 7. **Investor survey questions**

Question	Scale
1. How would you assess your investment knowledge?	{Very good (I am a professional investor) / Good / Average / Weak / Very weak}
2. Which financial instruments do you invest in?	Deposits / Shares (public) / Bonds / Real estate (excl. your primary residence) / Investment funds / Pension funds (voluntary 3rd pillar) / Private/ venture capital funds / Life insurance / Alternative investments
3–9. What effect do these factors have in making your investment decisions? Personal opinion / experience Advice from friends / relatives Advice from financial advisor Expert commentaries Specialized sources (e.g. Bloomberg) Mass media channels Intuition	{Very big / Big / Average / Small / Very small}
10.a. What average annual return would you expect over the next 10 years (2016–2026) by investing in US stock index (S&P 500)?	Open question
10.b. What average annual return would you expect over the next 10 years (2016–2026) by investing in Eurozone stock index (Euro Stoxx 50)?	Open question
11. What would be the highest tolerable annual fall in your portfolio?	{Would not tolerate any loss / Up to 5% / Up to 10% / Up to 15% / Up to 20% / Up to 25% / Up to 30% / Up to 40% / Up to 50% / Up to 60% / Up to 70% / Up to 80% / Up to 90% / Up to 100%}
12. Please indicate the size of an annual investment management fee you would be willing to pay if your investments generated average returns? (% from AuM)	{0% / Up to 0.5% / From 0.5% up to 1.0% / From 1.0% up to 1.5% / From 1.5% up to 2.0% / From 2.0% up to 2.5% / From 2.5% up to 3.0% / From 3.0% up to 3.5% / From 3.5% up to 4.0% / From 4.0% up to 4.5% / From 4.5% up to 5.0% / Above 5%}
13. Are you using services of personal investment advisor?	{Yes / No / No, but planning to use in the future}
14-18. In Lithuania generated a mere 0.4% of households are investing in stocks, i.e. 25 times lower than EU-average. What effect, in your opinion, do the below mentioned factors have on an exceptionally low investment rate in stocks in Lithuania? Lack of trust in financial intermediaries Lack of professionalism of financial intermediaries Underdeveloped local capital market General economic insecurity increasing demand for safe haven assets (e.g. cash, deposits) Lessons from global financial crisis	{Very big / Big / Average / Small / Very small}

TABLE 8. **Correlation matrix among predictor variables**

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Financial literacy (self-assessed) (1)	1.00									
Risk tolerance (2)	0.31	1.00								
Stock market return expectations (3)	0.04	0.12	1.00							
High investment fees (4)	(0.25)	0.01	0.31	1.00						
Usage of financial advisor services (5)	0.48	0.14	0.09	0.04	1.00					
Lack of trust in financial intermediaries (6)	0.18	0.04	0.06	0.27	0.10	1.00				
Lack of professionalism of financial intermediaries (7)	0.47	(0.03)	(0.15)	(0.04)	0.00	0.47	1.00			
Underdeveloped domestic capital market (8)	0.11	0.16	0.44	0.32	0.09	0.27	0.17	1.00		
Overall economic insecurity increasing demand for safe-haven assets (9)	(0.19)	0.04	0.05	0.21	(0.08)	0.01	(0.36)	(0.01)	1.00	
Lessons learned during 2008–2009 financial crisis (10)	0.02	(0.01)	(0.08)	0.25	0.03	0.30	0.07	0.03	0.46	1.00

TABLE 9. **Two sample t-test: Expected stock market return**

	Financial market participation	**Number of respondents (missing data)**	**Expected return**	**Standard Deviation**	**Test statistics**	**p-value**
USA benchmark stock market index (e.g. S&P)	Yes	52 (3)	8.19	6.46	-0.435	0.664434
	No	52 (7)	8.85	8.70		
Eurozone benchmark stock market index (e.g. EURO STOXX)	Yes	52 (3)	6.14	5.05	-1.788	0.076737
	No	52 (7)	8.42	8.62		

TABLE 10. **Two sample t-test: Risk tolerance (maximum tolerated annual loss)**

	Participation	**Number of respondents**	**Maximum tolerated annual loss (%)**	**Standard Deviation**	**Test statistics**	**p-value**
Investment funds	Yes	34	27.9	19.3	5.10	1.40682E-06
	No	80	11.1	14.7		
Stocks	Yes	35	31.3	23.0	7.31	4.27649E-11
	No	79	9.4	9.1		
Bonds	Yes	27	26.9	22.5	3.78	0.0002487
	No	87	12.8	14.9		
All financial assets	Yes	55	25.3	21.6	6.08	1.72887E-08
	No	59	7.5	5.8		
Real estate only	Yes	45	6.8	5.9	-4.94	1.9813718
	No	69	22.2	20.3		