THE IMPACT OF INVESTMENT HORIZON ON THE RETURN AND RISK OF INVESTMENTS IN SECURITIES IN LITHUANIA

Laimutė Urbšienė*
Vilnius University, Lithuania

Andrius Bugajevas
Vilnius University, Lithuania

Marekas Pipiras
Vilnius University, Lithuania

Abstract. *The paper focuses on the impact of time horizon on risk and return, which usually is the object of discussions about "stock versus bond". The aim of this paper is to investigate the transformation of risk and return when increasing the investment term, and to determine the impact of the investment horizon on investment results when investing in shares and bonds in Lithuania. The authors are proposing a hypothesis that a long-term investment in shares is not only more profitable, but also less risky than investment in bonds.*

Research of developed markets indicated that long-term investments in shares were more attractive than in bonds: the risk of shares fell to the risk of bonds, but at the same time, the return of shares remained high. However, there are just a few surveys in this field involving developing markets.

Empirical results of this research are based on OMXV index and 10-year government bond data from Lithuania. Our results are different from the research results carried out by authors in developed countries and show that even with an increase in the investment horizon up to 60 months, the risk of shares in Lithuania still remains higher than the risk of bonds, and return of shares is lower than that of bonds. Risk premium for shares is negative during all the periods exceeding 12 months. The results suggest that investors with long-run investment horizons must consider the impact of horizon as well as the development of securities market they invest in.

Key words: *risk, return, investment term, investment horizon, shares, bonds.*

* Corresponding author: Faculty of Economics, Vilnius University, Sauletekio av. 9, LT-10222, Vilnius, Lithuania, Tel.: +370-68672477, E-mail: laima.urbsiene@gmail.com

1. Introduction

The aim of each investor is the maximization of expected returns on investment and the simultaneous minimization of investment risk. Risk is an integral part of the investment and since it cannot be eliminated, it is necessary to manage it. The return on low-risk investment (e.g. fixed-term deposits) is very low and sometimes even below inflation, which means that the real return is negative. The investment in shares is deemed to be riskier, therefore the expected return should be higher as well. The risk assessment provides the probability of the potential loss and helps to answer the question what class of investment to choose. Therefore, the relationship between return and risk is one of the main issues in financial markets.

The aim of this paper is to investigate the transformation of risk and return when increasing the investment term and to determine the impact of the investment horizon on investment results when investing in shares and bonds in Lithuania. The authors are proposing a hypothesis that a long-term investment in shares is not only more profitable, but also less risky than investment in bonds.

Research of developed markets indicated that in the case of the long-term investment, the investments in shares were more efficient than in bonds: the risk of shares fell to the risk of bonds, but at the same time the return of shares remained high. However, there are only a few surveys done using the developing markets and the results of these surveys are not robust because of a short history of developing markets. The other peculiarities of developing markets are low liquidity, high sensitivity and small financial power of market participants. Lithuania is used as a case representing a developing market to test the transformation of risk and return when increasing the investment horizon. The empirical results of Lithuania are compared with those of the developed markets.

The remainder of the paper is organized as follows: the next chapter deals with literature review and discussion about the impact of the time horizon on the risk and return indicators. Risk analysis, arguments for selection and evaluation of risk efficiency indicators are presented in the second chapter. The third chapter provides the research methodology, and the fourth one presents and discusses the results of empirical research. The paper closes with conclusions.

2. Literature review on the impact of time horizon on the risk and return of securities

According to the traditional classification of securities, the shares are attributed to a riskier investment than bonds, as the bonds guarantee certain stable or floating interest and capital invested is redeemable in full on maturity (Gibson, 2000). In contrast, shares could be a subject to dividends, but the value of shares could depreciate up to zero in case of the bankruptcy of the company.

The Markowitz portfolio selection theory and Sharpe's asset pricing theory (CAPM) provide a theoretical framework for the identification and measurement of investment risk and the relationship between risk and expected return (Fama, French, 1993; Mangram, 2013).

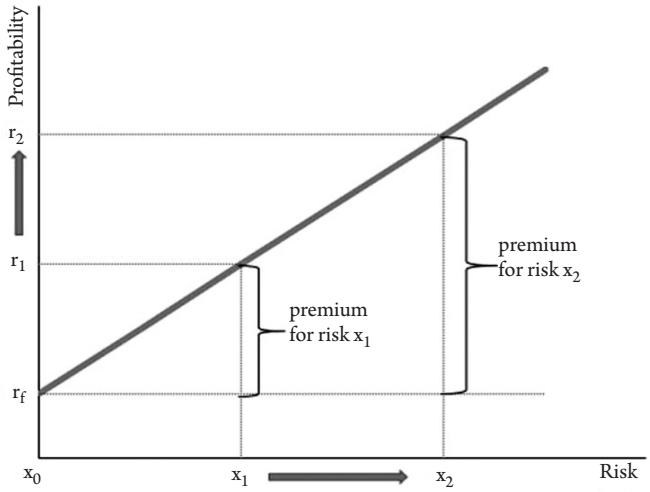

FIG. 1. **The relationship between return and risk**

Source: Compiled by the authors based on Fama, French, 1993; Sharp, 2012.

Figure 1 shows that at point A there is a zero-risk return, which is usually attributed to the government securities. For higher return, it is necessary to invest in higher-risk securities (Buiter, 1987). Thus, the market line of securities is a desired balance between the desirable return and acceptable risk (Fama, French, 1993). This can be explained by the fact that investors require higher risk premium for investing in riskier securities. Numerous studies have supported CAPM. Berzon and Volodin (2010) calculated that during the period of 1928-2008, US treasury bills earned the lowest average annual return and the lowest risk expressed as standard deviation (3.74 % and 3.02 %, respectively), and US shares made the highest return and the highest risk (10.97 % and 20.01 %, respectively). The results show that the riskier securities provide higher return and the efficiency of investment should be assessed not only according to return, but also in terms of potential risk.

The asset pricing model and its suitability for measuring performance of different securities have also been tested by Douglas (1969) and Lintner (1965). The empirical results they obtained did not support the theoretical model. Their results show that the return of high risk securities is lower than predicted by the model, and vice versa, return on low risk securities is higher than the return predicted by the model. Levhari and Levy (1977) argue that this divergence "may result from using data calculated for an investment horizon that differs from the "true" investment horizon and the length of the "true" investment horizon affects return on securities under conditions of uncertainty".

One of the main weaknesses of the CAMP model is that this model assesses only two dimensions – a risk and return, but does not take into account the duration of the investment period, i.e. the time horizon. Robertson and Wright (1998) indicate that in the case of the long-term investment the shares are more attractive to the investor than the bonds: the risk of shares becomes equal to the risk of bonds, but at the same time the return of shares remains high. Therefore the CAMP model can be used only for a short term of investments.

The impact of lifetime of securities on their return is also supported by Levhari and Levy (1997), Siegel (1998), Berzon (2008), Berzon and Volodin (2010), Sangbae and In (2010). Lee, Kim and Kim (2014) argue that the investment horizons in asset pricing have important implications for the performance of the models as there is a common perception that investors with longer horizons should hold large proportion of their investments in risky assets since lengthening the investment horizon reduces the risk. Their empirical results demonstrate that the equity premium in the US financial market is investment horizon sensitive, that is, in the short run the returns from the risky assets are not high enough compared to returns from riskless assets, but when the investment horizon is extended, returns from the risky assets increase and this dominance over risky assets disappears. This could be explained by the fact that the longer the maturity of the security, the greater return is demanded by the investors, because the risk is greater when investing for a longer term (Valkanov, 2003). Therefore, the long-term securities tend to have higher return than the short-term ones (e.g. government bonds vs. treasury bills).

Numerous authors argue that time horizon is a key variable used for the determination of the right balance between the investment instruments such as stocks and bonds (Annex 1). Gibson (2000), Dimson, Mash & Staunton (2002) used the comparative analysis of historical data and found that the relationship between the "risk – return" ratio and time horizon is clearly visible in all the 16 countries analysed (the longer the investment horizon, the higher is the risk-return ratio), but the strength of this influence depending on term of investment was different. High volatility of shares in short-term investment is a negative factor, but in a long term it provides a higher return. The defined return may be reached with a lower risk by introducing the "risk – return" time horizon factor into the model.

When analyzing the impact of time horizon on return and risk in US during 80 years, Berzon and Volodin (2010) found that the risk of shares dropped 11 times: from 20.24 % when investing for one year to 1.86 % when investing for 30 years, the risk of bonds also dropped from 2.79 % to 2.19 %, respectively, and the risk of shares decreased much faster than of bonds, and during 30 years fell below the bond risk (1.86 % and 2.19 %, respectively).The test of cumulative returns series for stocks versus bonds at different investment horizons from 1 to 15 years performed by Ibarra (2013) gave evidence that bonds second order spatially dominate stocks for short horizons (from 1 to 4 years); and in contrast, at long horizons (of 6 years and longer), stocks dominate bonds. These find-

ings are consistent across different periods and international markets. This could lead to the conclusion that in the developed markets with the longer investment horizon, investments in shares are becoming almost equal to the investments in bonds by the coverage of risk premium per unit of risk, return to risk ratio and other efficiency indicators.

But recent studies cast some doubts on the impact of time horizon. Pastor and Stambaugh (2012) found that stocks are substantially more volatile over long horizons, and that observable predictors imperfectly deliver the conditional expected return. Hoevenaars, Molenaar et al. (2014) argue that investment horizon effect is much weaker compared to models in which only equity returns are subject to parameter uncertainty. They determined that the term structure of risk for stocks as well as for bonds is quite flat for investments up to 15 years. Gibson (2000) argues that due to a variety of psychological factors, the investors often reduce investment horizon. The result is that the amount of shares in securities portfolio is disproportionately low compared to the amount of bonds. Such a portfolio becomes very sensitive to the inflation. And this trend is increasing when the investor is trying to equate the quarterly and annual indicators of various investment instruments. Summarizing the research done on this topic we can state that the length of investment term plays a significant role in efficiency of investment and, therefore, it should be carefully considered.

3. Risk analysis and evaluation

When investing in securities, there is always a risk of losing part or all of the invested capital. The investment decisions are made under the uncertainty, and the risk in financial markets is associated with the probability of getting certain return. Financial risk can be defined as deviation away from expected historical returns during a particular time period (Shiller, 2003) or as the probability that the actual return on investments or cash flows will be different than planned (deviate from expected result) (Bracha, Brown, 2013; Wagner, Lou,1971). The risk and risk-causing factors can be classified according to different criteria: the sector it shows up, origination, the nature of the impact, posibility to diversify (Barberis, Huang, Santos 2001; Campbell, Yogo, 2006, Fama, 1965, Greenwood, Sheifer, 2013, Markowitz, 1959). In this paper we focus on financial speculative risk, which means the risk that is characterized by the fact that it can bring not only the losses but also the profits.

Risk can be analyzed in two ways: on stand-alone basis, when asset is analyzed in isolation, and on portfolio basis when asset is part of securities portfolio (Mangram, 2013). According to the possibility to reduce the risk via the concept of diversification (which means that properly selected set of securities together exhibit lower risk than investment in any individual security or singular security class), the total risk of a security could be divided into two basic components: systematic risk (a macro-level form of risk, or undiversifiable risk), and unsystematic risk (a micro-level form of risk therefore diversifiable one) (Sharp,1996; Levhari and Levy, 1977). Depending on the

investment instrument, the total risk structure may be different (Lewellen, 2004; Torous, Valkanov, Yan Shu, 2004).

The risk can be measured using various statistical methods. The most popular **total risk** measure is the variance of returns or its square root - standard deviation. (Jung, Shiller, 2005, Wu, Ho-Mou, Wen-Chung Guo, 2004). It is sensible to measure the variance only when the returns comply with the standard normal probability distribution. Because the return of securities at a given moment of time can be assessed as a random value, the expected return of securities is the function of standard normal probability distribution. Fabozzi, Modigliani & Jones (2007, 261 p.) argue that "despite the fact that the normal standard distribution function is used in finance very often, the empirical data do not support the assumption that the return on the securities is distributed under the normal distribution. The studies have shown that the function cannot only be non-symmetrical, but may also have thick, heavy "tails", where the extreme sample values are evidenced". It means that extreme values may occur more often in comparison with the normal distribution. Currently, a number of studies (Barberis, Huang, Santos 2001; Bracha, Brown, 2013; Campbell, Yogo, 2006; Greenwood, Sheifer, 2013; Shiller, 2014) are being carried out in order to modernize the finance theory discussed in this section. Nevertheless, the risk measurement based on normal distribution remains the fundamental tool in both the studies and the practice.

Systematic risk is measured using the *beta (β)* coefficient, which shows how the price of individual security reacts to the fluctuations of securities market, which has a beta coefficient equal to one. Mostly beta of security is positive, because the prices of securities change in the same direction as the total securities market does.

When investments with significantly different expected returns are compared, the **return to risk** ratio (1/coefficient of variation,1/CV) is a more suitable measure than standard deviation. The return to risk ratio allows us to assess whether the higher risk is covered by the higher return and indicates the relative value of riskiness (Shiller, 2014). The return to risk ratio is a normalized indicator, so the securities with very different characteristics of return and risk can be compared.

Efficiency measures. Success and efficiency of investments in securities can be measured using various ratios, but the most acknowledged and used are the Sharpe, Treynor and Sortino ratios. The **Sharpe ratio** is used to evaluate how effectively the return on assets compensates for the risk undertaken. It is used for the comparison of different classes of securities at different periods of time. The **Treynor ratio** is an alternative indicator for measuring the efficiency of risk. It differs from the Sharpe ratio in that instead of the total risk (σ), systematic risk (β) is employed; it ignores the non-systematic risk and measures the risk premium per each unit of systematic portfolio risk (Sharpe, 1966). When measuring well-diversified portfolios the Sharpe and Treynor ratios are quite similar, but they would differ significantly if undiversified portfolio is measured, since the Treynor ratio cannot capture the portion of variability that is due to lack of diversification, i.e. the non-systematic risk (Sharpe, 1966). Treynor as-

sumed that portfolios are fully diversified and any other serious discrepancies between the portfolio and the market return are temporary. Therefore, only systematic risk of the portfolio is calculated, and the long-term relationships of these parameters are considered. The Sharpe ratio denominator, i.e. standard deviation of securities portfolio, is obtained by examining the historical results. It is impossible to separate systemic and non- systemic risks when examining the historical results, therefore the Sharpe ratio is more suitable for the measurement of historical results and the Treynor ratio – for predicting future performance.

Although the Sharpe ratio is widely used in investment analysis, there are some drawbacks associated with the determination of the risk as the standard deviation of return on investment. As a result, securities with the positive and negative fluctuation may have similar volatility values. A ratio such as the Sharpe ratio punishes the investment „for good risk", which provides positive returns for investors. These drawbacks may be eliminated when using the **Sortino ratio**, which only considers the downside deviation and only the standard deviation of negative returns is used in its denominator (Sortino, Price, 1994). However, determining which ratio to use depends on whether the investor wants to focus on standard deviation or downside deviation.

Because all ratios discussed have their advantages and drawbacks, and in order to have more comprehensive analysis of the impact of investment horizon and to evaluate how it impacts the efficiency of the investment, it is sensible to use a set of ratios.

4. Research methodology

In order to determine the impact of the investment term on the return and risk when investing in shares and bonds in Lithuania and to test the hypothesis that long-term investment in shares is not only more profitable, but also less risky compared with bonds, the average return, risk, the Sharpe ratio, the Sortino ratio and the return to risk ratio were employed.

The research covers 10 years: form 2004 to 2014. The influence of time horizon on the return and risk was assessed during total research period and during three different time periods distinguishing the financial crisis of 2007–2009 and its impact on results. The transformation of main parameters of securities: return, risk, the Sharpe ratio, the Sortino ratio and the return to risk ratio (1/CV) was analyzed and compared gradually increasing the investment term from 1 to 60 months (Fig. 2).

Return of shares was calculated on the basis of "OMX Vilnius" index, VILIBOR was used for the assessment of the risk-free return rate. In order to stabilize VILIBOR, the weighted average of 3, 6 and 12 months was chosen (6 months – 50 %, 3 and 12–25% each). The ten-year bond return was obtained from the globally acting website www.investing.com*. Due to a short financial market performance history Lithuanian market may be considered as a developing one.

* This website is the only source where this data is publically available

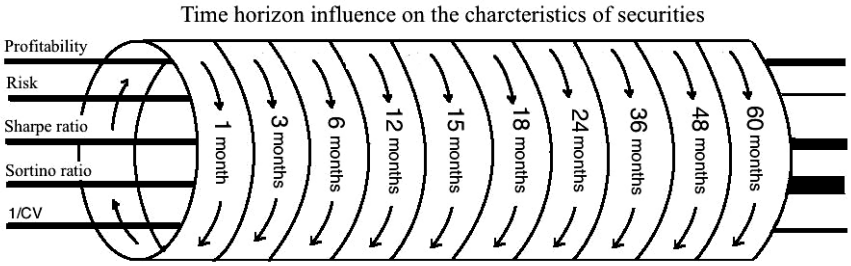

FIG. 2. **Research structure: main parameters of securities analyzed during different investment terms**

Source: Compiled by the authors

The research consists of two parts. At first the transformation of risk and return during the total research term (01/08/2004 – 31/08/2014) was assessed and after that the total research term was split into 3 periods separating the financial crisis (Table 1). Data sample was obtained using the moving average method, e.g. when calculating the return of 6 months, the returns of 1-6; 2-7; 3-8 months etc. were calculated.

TABLE 1. **Sample sizes of different investment terms**

Time period analyzed	Investment terms (months)										
	1	3	6	12	15	18	24	25	36	48	**60**
01/08/2004-31/08/2014	121	118	116	110			98		86	74	62
01/08/2004-28/09/2007	38	33	30	27	24	18		12			
28/09/2007- 31/07/2009	22	20	17	11	8	5					
31/07/2009- 31/08/2014	61	59	56	50	47	44		37			

Source: Compiled by the authors

The hypothesis that long-term investment in shares is not only more profitable, but also less risky than investment in bonds was rejected. The further analysis led to the assumption that the financial crisis of 2007-2009 had a major influence on the results. Based on this assumption, the research period was split into 3 parts (Fig.3):

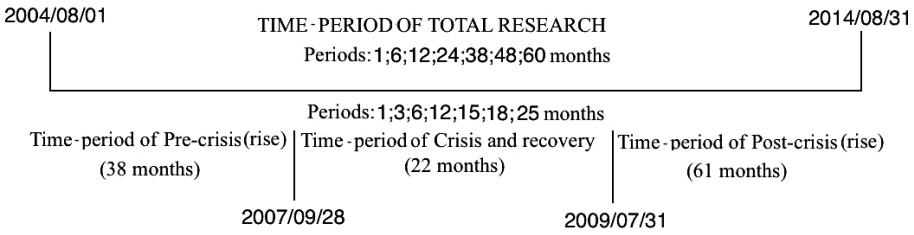

FIG. 3. **Structure of research periods**

Source: Compiled by the authors

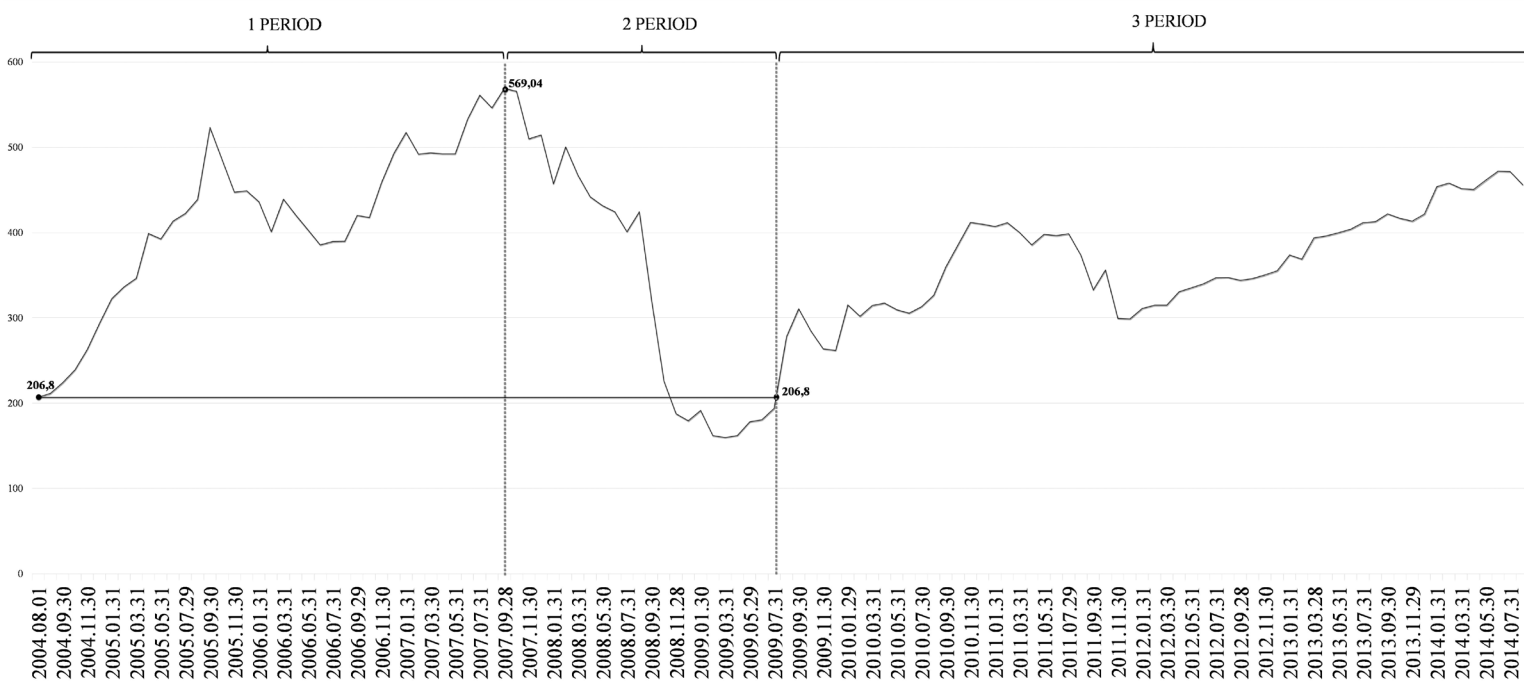

FIG. 4. **The OMX Vilnius index and research periods**

Source: Compiled by the authors

1. Pre-crisis period of 01/08/2004 – 28/09/2007 (38 months).
2. Crisis and recovery period 28/09/2007 – 31/07/2009 (22 months).
3. Post-crisis period of 31/07/2009 – 31/08/2014 (61 month).

The highest point of the OMX Vilnius index was chosen as a starting point for the end of the first and the beginning of the second period (28/09/2007) (Fig. 4). The point where the index value after a sudden fall starts to rise and reaches the index value at the beginning of the first period is the end of the second and beginning of the third period (index value – 206.8 on 31/07/2009 and 01/08/2004). The assessment of the volatility of shares during those periods showed that the crisis and recovery time period (= 10.4 %) exhibited the highest instability in comparison with the pre-crisis (= 6.4 %) and post-crisis period of rise (= 6.7 %).

The monthly return when investing for a one-month term was calculated by using the holding period yield formula (Robertson, Wright, 1998). Average monthly return is calculated using geometric average, which is compounded using monthly returns. The standard deviation was used for the risk assessment; the Sharpe ratio, the Sortino ratio and normalized return, i.e. the return to risk ratio were employed for the assessment of risk performance. All calculations were based on monthly data.

Empirical results displayed in tables and pictures are compared with the results of the developed market discussed in the literature review. The comparison focuses on transformation of trends of variables analysed.

5. Transformation of risk and return depending on the length of investment term

The risk and return ratios depending on the length of investment term in Lithuania presented in Table 2 are different from the research results carried out by authors in other countries. Even with the extension of the investment term up to 60 months, the risk of shares in Lithuania still remains higher than the risk of bonds, and expected return of shares is lower than that of bonds. The Sharp ratio for shares is negative during all periods exceeding 12 months, meaning that risk premium is negative. It may be due to quite short research term that is highly influenced by the financial crisis of 2007–2009. Therefore, in order to examine the risk and return during the different investment terms more accurately, total research time was divided into three periods.

Impact of time horizon on the risk of shares and bonds. The examination of standard deviation shows that the investment risk of both shares and bonds drops when the investment term is increased for all periods analyzed (Annex 2). These results comply with the results of Gibson (2000), Ibbotson & Chen (2002), Dimson, Mash & Staunton (2002), Berzon & Volodin (2008). The difference is that the risk of shares never drops below the risk of bonds, whether we analyze the total research period or three periods separately. When the investment term is increased from 1 month to 60 months, the risk of shares drops 10.7 times (from 8.13 % to 0.76 %) and the risk of the bonds

TABLE 2. **Change in risk-return ratios of shares and bonds depending on the investment term in Lithuania**

Investment term	Standard deviation	Profitability avg.	Profitability max.	Profitability min.	Sharpe ratio	Sortino ratio	1/CV
Shares							
1month	8.13%	0.98%	43.44%	-29.60%	0.09	0.13	0.12
6 months	4.52%	0.68%	11.70%	-14.84%	0.09	0.12	0.15
12 months	3.37%	0.43%	7.33%	-8.98%	0.04	0.05	0.15
24 months	2.08%	0.16%	3.96%	-4.59%	-0.07	-0.09	0.08
36 months	1.36%	-0.02%	2.81%	-2.77%	-0.26	-0.30	-0.02
48 months	1.02%	-0.10%	1.90%	-1.86%	-0.44	-0.46	-0.10
60 months	0.76%	0.01%	1.75%	-0.84%	-0.46	-0.51	0.01
Bonds							
1month	0.21%	0.44%	1.19%	0.21%	0.78	14.25	2.10
6 months	0.19%	0.45%	1.09%	0.23%	0.87	23.44	2.38
12 months	0.18%	0.46%	0.96%	0.27%	0.94	59.74	2.62
24 months	0.14%	0.48%	0.76%	0.31%	1.15	198.83	3.34
36 months	0.11%	0.50%	0.65%	0.33%	1.44	-	4.38
48 months	0.08%	0.51%	0.60%	0.36%	2.03	-	6.30
60 months	0.04%	0.53%	0.57%	0.41%	4.31	-	13.59

Source: Compiled by the authors

drops only 5.3 times (from 0.21 % to 0.04 %) when analyzing the total period (Fig. 10). Also, the risk of shares drops much quicker in comparison with bonds in all three separate periods analyzed. But in all cases the risk of shares still remains higher than the risk of bonds (Figs. 5-8). These results do not comply with the developed market results.

When comparing the risk during three research periods we can state that the least risky investment period is the post-crisis period for shares and the pre-crisis period for bonds. The crisis period is the riskiest one for both securities. Even during the time when the market was strained by financial crisis the extension of investment term

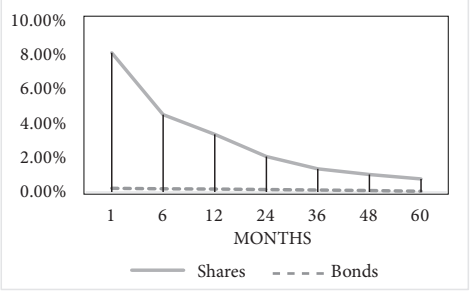

FIG. 5. **Standard deviation of shares and bonds during the total period**

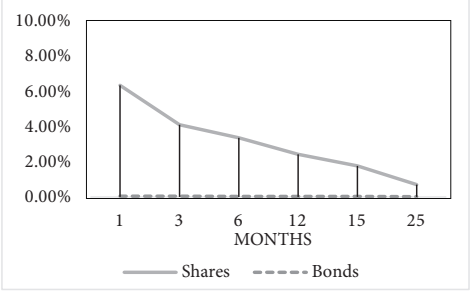

FIG. 6. **Standard deviation of shares and bonds during the pre-crisis period**

Source: Compiled by the authors

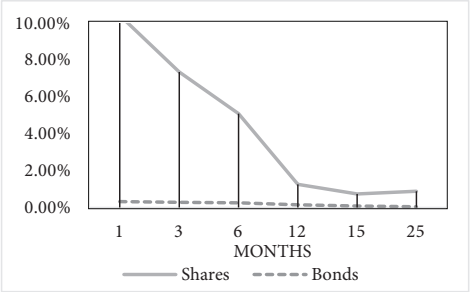

FIG. 7. **Standard deviation of shares and bonds during the crisis period**

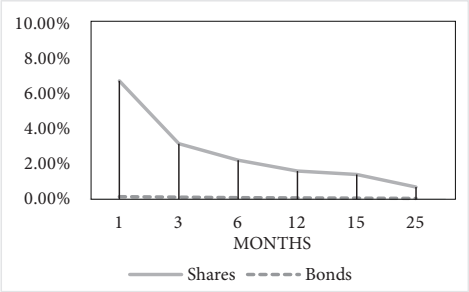

FIG. 8. **Standard deviation of shares and bonds of the post-crisis period**

Source: Compiled by the authors

reduced the risk of shares almost 12 times, from 10.43 % (1 month) to 0.88 % (18 months), and the risk of bonds - 8 times, from 0.32 to 0.04 %. Based on the finding that the risk of shares decreases faster than the risk of bonds, we can argue that if the length of the investment term in Lithuania could be extended, the risk of shares could fall below the risk of bonds, and during the long investment periods the results will comply with the ones obtained by Gibson (2000), Berzon (2008), Berzon & Volodin (2010), Dimson, Mash & Staunton (2002).

Impact of time horizon on the return on investment in shares and bonds. The examination of the changes in average return on investment in shares and bonds depending on the length of investment term (Annex 3) revealed that when investment term is increased, the average monthly return on shares drops (from 0.98% when investing for 1 month to 0.01% when investing for 60 months), but the average monthly return of bonds increases (from 0.44% to 0.53%, respectively). The investment return on shares is negative when investing for 36 and 48 months and during the total crisis period (Figs. 9 and 11). The highest loss of 7.35 % was during the crisis period when the investment term was 12 months.

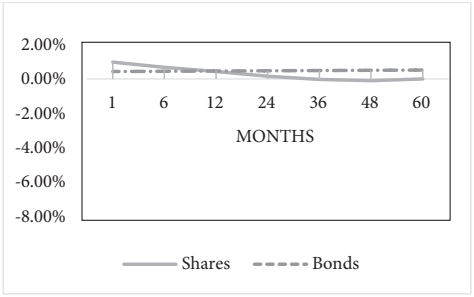

FIG. 9. **Average monthly return on shares and bonds during the total period**

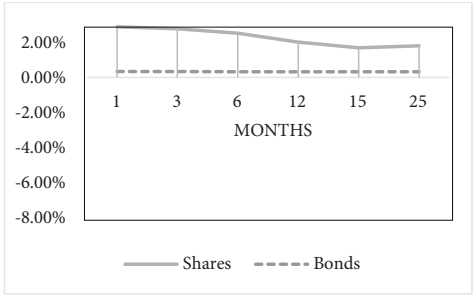

FIG. 10. **Average monthly return on shares and bonds during the pre-crisis period**

Source: Compiled by the authors

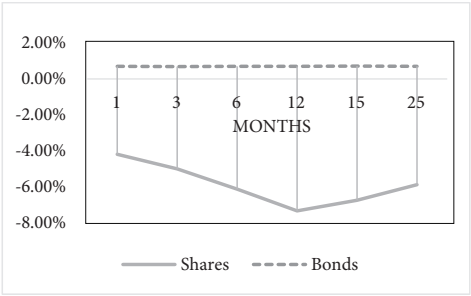

FIG. 11. **Average monthly return on shares and bonds during the crisis period**

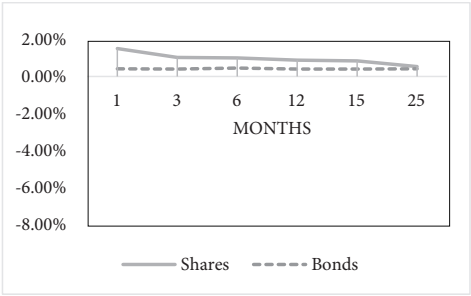

FIG. 12. **Average monthly return on shares and bonds during the post-crisis period**

Source: Compiled by the authors

When the investment term is increased, the average monthly return of bonds is increasing during the entire research period (Fig. 9). When comparing return of bonds during three separate periods we can see that the return of bonds fluctuates from 0.69 to 0.71 % and actually does not depend on the length of investment term (Figs. 9-12). When investing in bonds for long investment terms, the capital loss is highly unlikely, because the historical minimum return of bonds during all investment periods is above zero.

This means that when the length of the investment term is increased and the investment is assessed only by return, the investment in bonds in Lithuania is more attractive than the investment in shares, which contradicts the theory. Such results could be explained by quite a short period analysed because of the short developing market history and high risk of securities, which results in high values of standard errors of the findings.

Impact of time horizon on the efficiency of investments in shares and bonds. The **Sharpe** ratio analysis (Annex 4) shows that the investments in bonds in Lithuania look much more attractive, because the Sharpe ratio increases when the investment hori-

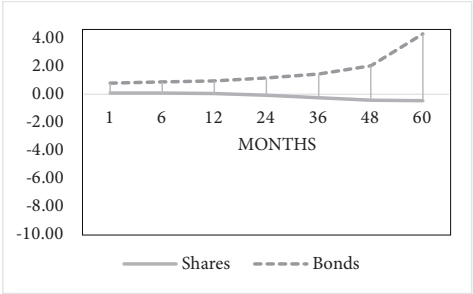

FIG. 13. **The Sharpe ratio of shares and bonds of the total period**

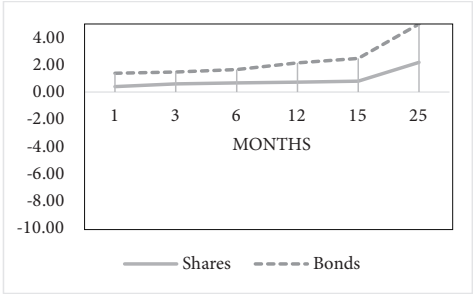

FIG. 14. **The Sharpe ratio of shares and bonds of the pre-crisis period**

Source: Compiled by the authors

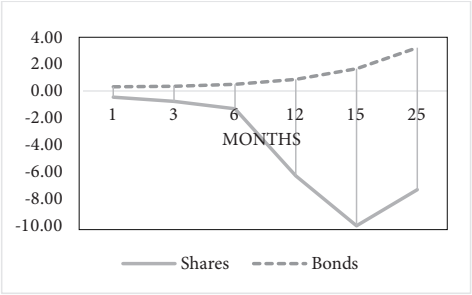

FIG. 15. **The Sharpe ratio of shares and bonds of the crisis period**

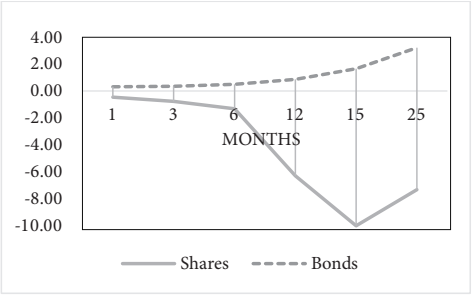

FIG. 16. **The Sharpe ratio of shares and bonds of the post-crisis period**

Source: Compiled by the authors

zon is increased both during the entire research term and during separate three periods (Figs. 13-16). The bond premium per unit of risk appreciates by 4.5 times when investment term is increased from 1 to 60 months (from 0.78 % up to 4.31% accordingly).

The investments in shares gave the opposite results: the Sharpe ratio of shares decreased when the investment term increased (from 0.09 % for 1 month to -0.46 % for 60 months) and became negative when the investment term exceeded 24 months. During the crisis period, the Sharpe ratio of shares was negative and decreased when the investment term was increased. The Sortino ratio was chosen for the assessment of negative periods.

The Sharpe ratio during the pre-crisis and after-crisis periods clearly displays that when the investment term was increased, the Sharpe ratio of both the shares and bonds increased. (Figs. 14 and 16). Although the Sharpe ratio of shares and bonds during the post-crisis period is constantly growing when investment term is increased, the gap between the Sharpe ratio values of shares and bonds is growing as well (from 1.72 p.p. for 1 month to 5.27 p.p. for 30 months). It means that the efficiency of investing in bonds is much greater than investing in shares and this efficiency increases when the time horizon is increased. Such results of Lithuanian market contradict the results of the developed markets, where the efficiency of shares, represented by the Sharpe ratio, is growing more rapidly than that of bonds, and for long term investments, the efficiency of shares outpaces the efficiency of bonds, which absolutely complies with the theory.

The analysis of the **Sortino*** ratio during different periods and for different investment terms (Annex 5) shows quite different results for shares and for bonds. During the total investment period the Sortino ratio of bonds is growing for investments of up to 24 months, and for investments of 36, 48 and 60 months has no value at all because there is no return which is lower than or equal to the risk-free rate. This means that in the case of investment in bonds for the term exceeding 24 months, theoretically, the risk does not exist at all (Fig. 17).

* The denominator of the Sortino ratio has only the standard deviation of negative returns

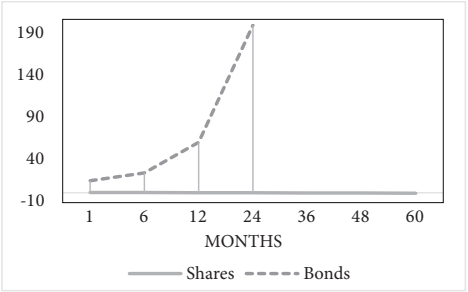

FIG. 17. **Sortino ratio of shares and bonds of the total period**

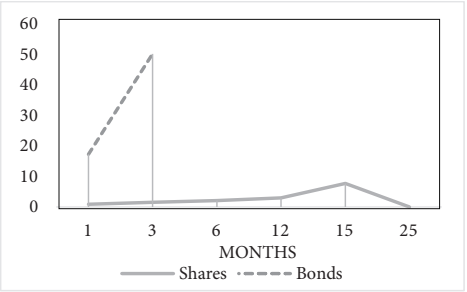

FIG. 18. **Sortino ratio of shares and bonds of pre-crisis period**

Source: Compiled by the authors

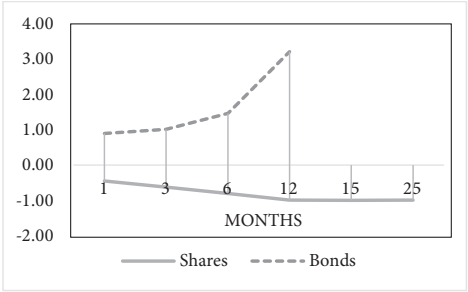

FIG. 19. **Sortino ratio of shares and bonds of the crisis period**

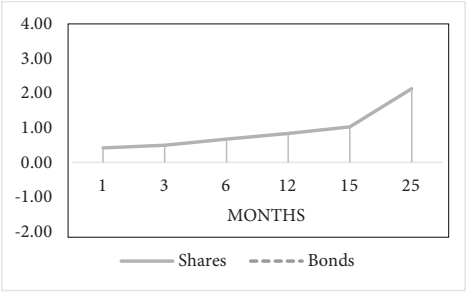

FIG. 20. **Sortino ratio of shares and bonds of post-crisis period**

Source: Compiled by the authors

The Sortino ratio of shares decreases over the total investment period and assumes a negative value when investment term exceeds 24 months, because the expected return of shares is lower than the market risk-free rate of return. The negative Sortino ratio indicates the maximum possible risk of investment (Figs. 23-24). As is the case with the Sharpe ration, during the pre-crisis and post-crisis period the Sortino ratio grows when investment term is increased, which means that with a longer investment term there are less returns on shares and bonds that would be lower than or equal to the risk-free rate and consequently, the extension of investment term lowers the risk. When the investing horizon exceeds 30 months for shares and 6 months for bonds, the Sortino ratio has no value because the return of these securities is not lower than or equal to the risk-free rate (Figs. 23 and 25). During the crisis period when the investment term is increased, the Sortino ratio for bonds is growing and, conversely, it is decreasing for shares.

The analysis of the **return to risk ratio** (Annex 6) shows that in Lithuania during all periods analysed the return to risk ratio of bonds is higher than that of shares and when investment term is increased, the return per unit of risk on bonds is growing during the total research term and during three separate research periods, but the return per unit of risk on shares has no obvious trend and fluctuates unsystematically when the total period is analyzed (Figs. 21-24). During the pre-crisis period normalized return on bonds

is much higher than on shares, but this difference significantly decreases if the length of investment periods is extended (Annex 6). For one month investments, return to risk ratio for bonds is 17.3 times higher, while for 30 months, this difference drops twice and is 9.3 times higher than that for shares. The return to risk ratio of shares during the crisis is negative, and by contrast, for bonds it is positive, and its value increases by almost 3 times when the length of investment term is extended from 1 to 30 months (Fig. 23).

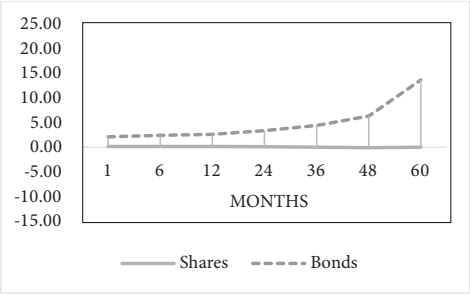

FIG. 21. **Return to risk ratio of shares and bonds of the total period**

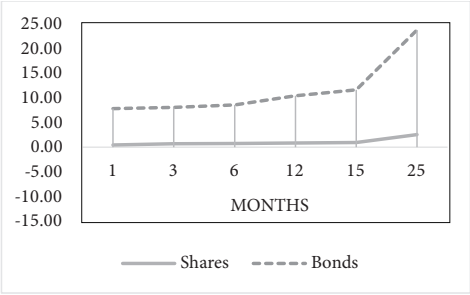

FIG. 22. **Return to risk ratio of shares and bonds of the pre-crisis period**

Source: Compiled by the authors

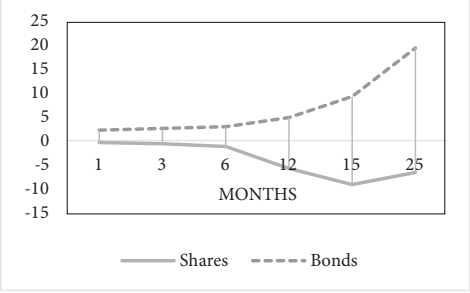

FIG. 23. **Return to risk ratio of shares and bonds of the crisis period**

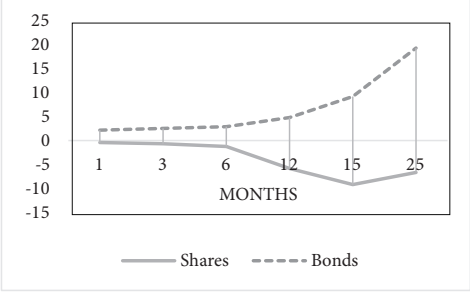

FIG. 24. **Return to risk ratio of shares and bonds of the post-crisis period**

Source: Compiled by the authors

The growth rate of normalized return for bonds is higher than for shares, because in Lithuania the average return on bonds increases and the risk decreases more rapidly than that for shares when the investment term is extended. These results contradict the developed market results where the normalized return for shares is gradually increasing, and for long investment horizons, it becomes higher than for bonds.

During the crisis period, the return, the Sharpe, the Sortino and return to risk ratios for shares remain negative. On the contrary, for bonds, the Sharpe, the Sortino, return to risk ratios increase when the investment term is increased except for the return ratio, which remains almost stable. This also demonstrates that when the investment term is quite short (the case of developing markets), investments in bonds are much attractive than investments in shares.

The research results did not confirm the hypothesis that a long-term investment in shares in Lithuania is not only more profitable, but also less risky than investment in bonds. This can be explained by the following reasons: a) the research term is too short, the minimum investment term has to be over 20 years for the risk efficiency of shares to exceed the risk efficiency of bonds (Dimson, 2003); b) because monthly, not annual data were analyzed; 3) the financial crisis of the years 2007-2009 had significant impact on the results; 4) due to the differences between the development of securities markets.

6. Conclusions

Classical theory of the securities market and linear CAMP model are valid only without the third dimension – the time horizon, therefore the CAMP model can be used only for short term investments. The examination of research done by other authors in developed countries revealed that if the investment horizon is lengthened, the risk of shares and bonds is significantly reduced. In the long term, shares became less risky than the bonds, but the return of shares still remained higher. When the length of the investment is expanded, the volatility of securities transforms into a higher probability of greater return. These results lead to the conclusion that during the longer investment term, investments in shares become more attractive to investors.

The research results of transformation of risk and return depending on the length of investment term of shares (OMXV index) and 10-year government bonds in Lithuania proves that the investment horizon plays a key role in efficiency of investment. But the impact of expanding of investment horizon on performance indicators in Lithuania is different when compared with research results carried out by authors in developed countries. Even with the extension of the investment term up to 60 months, the risk of shares in Lithuania still remains higher than the risk of bonds and the average return of shares is lower than that of bonds. Risk premium of shares is negative during all periods exceeding 12 months, which means that investors should carefully limit their risk.

The results of the impact of time horizon on the risk and return indicators are not unanimous for different indicators and for different periods analysed. When the length of the investment term is increased, the risk of shares decreases much faster than that of the bonds and gradually gets closer to the bonds during all periods analyzed. Based on these results, we can argue that if the length of the investment term in Lithuania could be extended, the risk of shares could fall below the risk of bonds, and during the long term, investments results will comply with the ones obtained by the authors Gibson (2000), Ibbotson & Chen (2002), Dimson, Mash & Staunton (2002) in developed markets. When the investment term is increased, the average monthly return of shares drops, but the average monthly return of bonds increases. Only during the pre-crisis period and the post-crisis period the return of shares is higher than that of bonds. Therefore, we can conclude that when the length of the investment term is increased and the investment is assessed only by the average monthly return, the investment in

bonds is more profitable than the investment in shares in Lithuania and this does not comply with the results in developed markets. These results also suggest that when the investment term is quite short (the case of developing markets), investments in bonds are more attractive than investments in shares.

Although the hypothesis that long-term investment in shares is not only more profitable, but also less risky than investment in bonds cannot be confirmed in Lithuania, we can see clear trends of risk fall when the investment term is extended. According to the Sharp ratio, the Sortino ratio and the return to risk ratio, the efficiency of investing in bonds is much greater than investing in shares, and it increases when the time horizon is expanded. Such results of Lithuanian market contradict the results of developed markets, where the efficiency of shares grows more rapidly than that of bonds and gradually outpaces the efficiency of bonds, which absolutely complies with the theory.

Although the risk performance indicators in Lithuania show that investment in bonds is more efficient, it can be argued that in Lithuania, like in the majority of the countries researched, the longer the investment term, the stronger is the impact of the investment term on the risk and return indicators of the securities. The results of the pre-crisis and post-crisis periods showed that the increase of the investment term has a positive impact on both the risk and the return ratios of shares and of bonds in Lithuania. The length of investment term and the development of securities market have a significant impact on the risk and return characteristics of securities. For this reason, they are two of the key issues that should be taken into consideration when investment decisions are made.

References

Barberis, N., Huang, M., Santos T. (2001). Prospect Theory and Asset Prices. Quarterly *Journal of Economics, 116*(1), 1–53

Bracha, A., Brown, D. J. (2013). *(IR)Rational Exuberance: Optimism, Ambiguity and Risk*. New Haven: Cowles Foundation Discussion Paper No. 1898.

Buiter, W. (1987). Efficient 'Myopic' Asset Pricing in General Equilibrium: A Potential Pitfall in Excess Volatility Tests. *Economics Letters*, *25*(2)p. 143–8.

Campbell, J. Y., Yogo, M. (2006). Efficient tests of stock return predictability. *Journal of Financial Economics, 81*(1), 27-60.

Cheng, L., Wang, M., & Chen, K. (2014). Institutional Investment Horizons and the Stock Performance of Private Equity Placements: Evidence from the Taiwanese Listed Firms. *Review Of Pacific Basin Financial Markets & Policies*, *17*(2), 1-30.

Dimson, E., Marsh, P. & Staunton M. (2002). *Triumph of the Optimists: 101 Years of Global Investment Returns*. Princeton: University Press.

Douglas, G. W. (1969). Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency. *Yale Economic Essays, 9*, 3-45.

Ibbotson, G. & Chen, P. (2002). *Stock Market Returns in the Long Run: Participating in the Real Economy*. Yale ICF Working Paper No. 00-44

Fabozzi, F. J., Modigliani, F. & Jones, F. J. (2007). *Foundations of financial markets and institutions.* New Jersey: Pearson Education Inc. p. 261

Fama, E. (1965). Random Walks in Stock Market Prices. *Financial Analysts Journal*, Sept/Oct. pp. 55–59.

Fama, E. F., French, K. R. (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics, 33* (1), 3–56.

Favero, C. A., & Nucera, F. (2014). How Much Does the Stock Market Risk Decline with the Investment Horizon? A Cross-Country Comparison. *Economic Notes*, *43*(1), 1-19.

Gibson, R. C. (2000). *Asset Allocation: Balancing Financial Risk.* McGraw-Hill Education.

Greenwood, R., Sheifer, A. (2013). *Expectations of Returns and Expected Returns*. NBER Working Paper No 18686, January. National Bureau of Economic Research, Inc.

Hoevenaars, R. M., Molenaar, R. J., Schotman, P. C., & Steenkamp, T. M. (2014). Strategic Asset Allocation For Long-Term Investors: Parameter Uncertainty and Prior Information. *Journal of Applied Econometrics*, *29*(3), 353-376.

Ibarra, R. (2013). A spatial dominance approach to evaluate the performance of stocks and bonds: Does the investment horizon matter?. *Quarterly Review of Economics & Finance*, *53*(4), 429-439.

Jung, J., Shiller, R. (2005). Samuelson's Dictum and the Stock Market. *Economic Inquiry*, Vol. 43, Issue 2, 221–228.

Lee, E., Kim, C., & Kim, I. (2015). Equity premium over different investment horizons. *Empirical Economics*, *48*(3), 1169-1187.

Levhari, D., & Levy, H. (1977). The Capital Asset Pricing Model And The Investment Horizon. *Review of Economics & Statistics*, *59*(1), 92.

Lewellen, J. 2004. Predicting Returns with Financial Ratios. *Journal of Financial Economics*, 74(2), 209–35.

Lintner, J.(1965). Security Price, Risk, and Maximal Gains from Diversification. *Journal of Finance*.

Mangram, M.E. (2013). A Simplified Perspective of the Markowitz Portfolio Theory. *Global Journal of Business Research*. Vol. 7, Issue 1, 59-70

Markowitz, H. M. (1959). *Portfolio Selection: Efficient Diversification of Investment.* Yale University Press.

Pástor, Ľ., & Stambaugh, R. F. (2012). Are Stocks Really Less Volatile in the Long Run?. *Journal of Finance*, *67*(2), 431-478.

Polk, C., Thompson, S., Vuolteenaho, T., (2003). *New forecasts of the equity premium*. Unpublished working paper. Harvard University.

Robertson, D., Wright, S. (1998). *The Good News and the Bad News about Long-Run Stock Market Returns.* University of Cambridge, Department of Applied Economics.

Sangbae, K., & In, F. (2010). Portfolio allocation and the investment horizon: a multiscaling approach. *Quantitative Finance, 10*(4), 443-453.

Siegel, J. (1998). *Stocks For The Long Run.* New York: McGraw-Hill.

Sharpe, W. F. (1966). Security Prices, Risk, And Maximal Gains From Diversification: Reply. *Journal of Finance*, *21*(4), 743-744.

Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business*, *39*(1), 119-138.

Sharpe, William F. (2012). William F. Sharpe: Selected Works. *World Scientific-Nobel Laureate Series:* Vol. 2. World Scientific.

Shiller, R. 2003. *The New Financial Order: Risk in the 21st Century*. Princeton: Princeton University Press.

Shiller, R. J. (2014). Speculative Asset Prices. *American Economic Review*, *104*(6), 1486-1517.

Sortino, F.A.; Price, L.N. (1994). Performance measurement in a downside risk framework. *Journal of Investing. 3,* 50–8.

Torous, W., Valkanov R., Yan Shu, (2004). On Predicting Stock Returns with Nearly Integrated Explanatory Variables. *Journal of Business, 77*, 937–66.

Treynor, J. L. (1993). In Defense of the CAPM. *Financial Analysts Journal, 49*(3), 11.

Treynor, J. L. (2016). Long-Term Investing. *Financial Analysts Journal, 72*(4), 7-10.

Valkanov, R., 2003. Long-horizon regressions: Theoretical results and applications. *Journal of Financial Economics, 68*, 201–232.

Wagner, W. H. & Lou, S. (1971). The effect of Diversification on Risk. *Financial Analysis Journal*, 1971 November - December, p. 2-7.

Wu, Ho-Mou, Wen-Chung Guo, (2004). Asset Price Volatility and Trading Volume with Rational Beliefs. *Economic Theory*, 23,795–829.

Berzon, H. (2008). Investment Time Horizon Impact on the Risk and Return of Financial Assets. (*Зависимость риска и доходности активов от временного горизонта инвестирования*). University management: Practice and Analysis (*Университетское управление: практика и анализ*) 2008. № 3. p. 65-72.

Berzon, H., Volodin C. (2010). Evaluation of Financial Assets According to Risk-return Criteria with Respect to Investment Term (*Оценка финансовых активов по критерию «риск-доходность» с учетом длительности инвестирования*). Journal Economics of the High school of Economics (*Экономический журнал Высшей школы экономики)*, 2010, Т. 14, № 3. p. 311-325.

Annex 1. **Research into investment horizon impact on the risk and profitability of securities**

Author	Object of research	Research period	Research findings
D. Levhari, H. Levy (1977)	Monthly rates of return for a sample of 101 stocks traded on the New York Stock Exchange	20 years (1948–1968)	Investment horizon has a great impact on both the regression coefficients and the reward to volatility index. The systematic risk of defensive stocks tends to decline while that for aggressive stocks tends to increase with increases in the investment horizon. The higher the investment horizon, the higher the reward to volatility index for both – aggressive and defensive stocks.
R. Gibson (2000)	USA bond and stock return and risk indicators depending on time horizon.	80 years (1928–1998)	During the long investment term, the risk of shares becomes equal to the risk of bonds and the profitability of shares remains higher than the bonds.
E. Dimson, P. Marsh, M. Staunton (2002)	Belgium, Italy, Germany, France, Spain, Japan, Switzerland, Ireland, Denmark, the Netherlands and England market. The impact of investment term on risk and return.	103 years (1900–2002)	The analysis of the risk and return during the long investment period revealed significant relationship between the risk – return ratios and investment horizon. However, the analysis of different markets shows that the long time horizon does not protect against the loss of capital even during a very long investment term.

Author	Object of research	Research period	Research findings
G. Ibbotson, P. Chen (2002)	The USA stock market risk premium during the long investment term.	75 years (1926-2000)	The long term supply of equity risk premium just slightly lower than the straight historical estimate. The authors estimate the expected long – term equity risk premium (relative to the long – term government bond yield) to be about 6 percentage points arithmetically and 4 percentage points geometrically.
H. Berzon (2008)	Russian stock and bond market return and risk indicators depending on the time horizon.	23 years (1995–2007)	A significant relationship between the risk - return ratios and investment horizon has been found. During longer investment terms, the shares become more attractive than the bonds, since the risk becomes equal and the return of shares remains higher than that of bonds.
N.I. Berzon, S.N.Volodin (2010)	USA yearly and Russian monthly stock and bond market returns and risk indicators depending on the time horizon.	USA 80 years (1928–2008) Russia 25 years (1995–2009)	Both markets show a significant relationship between the risk - return ratios and investment horizon. USA market results show that shares become less volatile, but remain more profitable than bonds. Empirical results for Russian market show that volatility of shares becomes less volatile, and shares are more profitable than bonds during the long term.
K.Sangbae, & F. In (2010)	US monthly data. Portfolio allocation and the investment horizon: a multi scaling approach	47 years (1963–2009)	When investment horizon is extended, the greater weighting should be allocated to stocks. The mean-reverting property of stock returns causes investors to perceive that stocks are less risky than bonds and T-bills at longer time scales.
L. Pastor R. F. Stambaugh (2012)	USA data, subject to independent and identical uncertainty, mean reversion, uncertainty about future expected returns, uncertainty about current expected return and estimation risk.	206 years (1802–2007)	Stocks are substantially more volatile over long horizons from an investor's perspective. Observable predictors imperfectly deliver the conditional expected return. The uncertainties reduce desired stock allocations of long-horizon investors contemplating target-date funds.
R. Ibarra-Ramirez (2013)	US, daily cumulative returns series for stocks and bonds at different investment horizons from one to ten years.	50 years (1962 to 2012)	When different portfolios of stocks and bonds are compared, for long investment horizons, only the portfolios with a sufficiently high proportion of stocks are efficient in the sense of spatial dominance.
R. P. P. M. Hoevenaars, R. D. J. Molenaar, P. C. Schoyman, T. B. M. Steenkamp (2014)	US data. Impact of parameter uncertainty on long-term risk and asset allocation of long-term investors who can invest in stocks, bonds and T-bills.	57 years (1952 – 2008)	Investment horizon effect in optimal asset allocations is much weaker compared to models in which only equity returns are subject to parameter uncertainty. Results are sensitive to alternative informative priors, but generally the term structure of risk for stocks and bonds is relatively flat for investment horizons up to 15 years.

Author	Object of research	Research period	Research findings
E. Lee, C. Kim & I. Kim (2015).	US market, cumulative return for the 3-Month Treasury bill as a riskless asset, and the S&P500, the Dow Jones Industrial Average (DJIA) and NASDAQ indices as a risky asset.	40 years (1971-2011)	Empirical findings show that the equity premium in the US financial market is investment horizon dependent. That is, the returns from the risk assets are not high enough compared to returns from riskless assets in the short run, but this dominance over risky assets in the short run disappears as the investment horizon gets longer.

Source: Compiled by the authors based on Gibson (2000); Berzon (2008); Berzon, Volodin (2010); Ibbotson & Chen (2002); Dimson, Mash & Staunton (2002); D.Levhari & H. Levy (1977), A.Tamoni (2012), R. P. P. M. Hoevenaars, R. D. J. Molenaar, Schoyman & Steenkamp (2014); Pastor & Stambaugh (2012).

Annex 2. **Change in the standard deviation of shares and bonds in Lithuania depending on the investment term**

Investment term	Total research period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
1 month	8.13	0.21	6.35	0.04	10.43	0.32	6.73	0.14
3 months	-	-	4.12	0.04	7.36	0.27	3.16	0.12
6 months	4.52	0.19	3.37	0.04	5.10	0.25	2.22	0.09
12 months	3.37	0.18	2.42	0.03	1.26	0.15	1.60	0.07
15 months	-	-	1.77	0.03	0.73	0.08	1.40	0.06
18 months	-	-	-	-	0.88	0.04	-	-
24 months	2.08	0.14	-	-	-	-	-	-
30 months	-	-	0.71	0.01	-	-	0.69	0.05
36 months	1.36	0.11	-	-	-	-	-	-
48 months	1.02	0.08	-	-	-	-	-	-
60 months	0.76	0.04	-	-	-	-	-	-

Source: Compiled by the authors

Annex 3. **Change in average monthly return of shares and bonds in Lithuania depending on the investment term**

Investment term	Total research period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
1 month	0.98	0.44	2.89	0.34	-4.20	0.70	1.51	0.42
3 months	-	-	2.78	0.34	-5.02	0.69	1.04	0.41
6 months	0.68	0.45	2.52	0.33	-6.14	0.71	1.01	0.46
12 months	0.43	0.46	2.03	0.33	-7.35	0.71	0.89	0.41
15 months	-	-	1.69	0.33	-6.76	0.72	0.85	0.41
18 months	-	-	-	-	-5.90	0.71	-	-

Investment term	Total research period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
24 months	0.16	0.48	-	-	-	-	-	-
25 months			1.82	0.33	-	-	0.55	0.41
30 months	-	-	-	-	-	-	-	-
36 months	-0.02	0.50	-	-	-	-	-	-
48 months	-0.10	0.51	-	-	-	-	-	-
60 months	0.01	0.53	-	-	-	-	-	-

Source: Compiled by the authors

Annex 4. **Change in the Sharpe ratio of shares and bonds in Lithuania depending on the investment term**

Investment term	Total time-period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
1 month	0.09	0.78	0.41	1.39	-0.46	0.32	0.20	1.82
3 months	-	-	0.61	1.48	-0.76	0.37	0.28	2.19
6 months	0.09	0.87	0.67	1.65	-1.32	0.50	0.39	2.79
12 months	0.04	0.94	0.73	2.15	-6.31	0.87	0.47	3.82
15 months	-	-	0.81	2.48	-10.01	1.66	0.51	4.28
18 months	-	-	-	-	-7.34	3.22	-	-
24 months	-0.07	1.15	-	-	-	-	-	-
30 months	-	-	2.19	5.01	-	-	0.59	5.86
36 months	-0.26	1.44	-	-	-	-	-	-
48 months	-0.44	2.03	-	-	-	-	-	-
60 months	-0.46	4.31	-	-	-	-	-	-

Source: Compiled by the authors

Annex 5. **Change in the Sortino ratio of shares and bonds in Lithuania depending on the investment term**

Investment term	Total time-period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
1 month	0.13	14.25	0.93	17.26	-0.45	0.90	0.42	N
3 months	-	-	1.56	50.25	-0.63	1.02	0.49	N
6 months	0.12	23.44	2.11	N	-0.81	1.47	0.68	N
12 months	0.05	59.74	2.95	N	-0.99	3.22	0.83	N
15 months	-	-	7.71	N	-1.00	N	1.03	N
18 months	-	-	-	-	-0.99	N	-	-
24 months	-0.09	198.83	-	-	-	-	-	-
30 months	-	-	N	N	-	-	2.13	N
36 months	-0.30	N	-	-	-	-	-	-
48 months	-0.46	N	-	-	-	-	-	-
60 months	-0.51	N	-	-	-	-	-	-

Source: Compiled by the authors

Annex 6. **Return-to-risk ratio of shares and bonds in Lithuania depending on the investment term**

Investment term	Total time-period		Pre-crisis period		Crisis period		Post-crisis period	
	shares	bonds	shares	bonds	shares	bonds	shares	bonds
1 month	0.12	2.10	0.45	7.80	-0.40	2.17	0.22	3.01
3 months	-	-	0.68	8.04	-0.68	2.54	0.33	3.56
6 months	0.15	2.38	0.75	8.53	-1.20	2.89	0.46	4.39
12 months	0.15	2.62	0.84	10.42	-5.84	4.85	0.56	5.82
15 months	-	-	0.96	11.63	-9.21	9.23	0.61	6.49
18 months	-	-	-	-	-6.67	19.36	-	-
24 months	0.08	3.34	-	-	-	-	-	-
30 months	-	-	2.56	23.75	-	-	0.79	8.84
36 months	-0.02	4.38	-	-	-	-	-	-
48 months	-0.10	6.30	-	-	-	-	-	-
60 months	0.01	13.59	-	-	-	-	-	-

Source: Compiled by the authors