

# DECISION-MAKING OF THE INVESTMENT PORTFOLIO APPLYING INTERMARKET ANALYSIS

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***Abstract:** The paper deals with the application possibilities of the intermarket analysis for the investment portfolio formation. The aim of this paper is to analyze how to adapt various financial market relations in order to assess the attraction of the different asset classes and taking into account it to form the investment portfolio. In the paper three different investment portfolio construction strategies have been analyzed. The first investment portfolio is formed from the decreasing financial markets, the second - from the rising financial markets, and the third portfolio includes all the financial markets. The study results showed that investing in equal proportions into stocks, bonds and commodities is more effective solution than investing in the market or in the reverse market. Including the currency into the basic portfolio has reduced the risk, but due to the declined returns the efficiency also decreased. The study results showed that the 'permanent portfolio' formation of the three asset classes is sufficiently effective in order to reduce investment portfolio risk and to achieve a reasonable return.*

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***Keywords:** Intermarket analysis, Financial markets, Stocks, Bonds, Commodities, Currencies.*

***JEL Classification:** G11, G15.*

## **Introduction**

The modern world is characterized by free movement of capital and labor, large dissemination of information, data sharing and processing capabilities. New technologies allow transferring and processing large amounts of information. Large information and data dissemination helps investors learn and quickly respond to various global events. Such dissemination of information increases the efficiency of the market, where investors immediately respond to all available information. Market efficiency developed by the information technologies encourages the relation strengthening between the different financial markets.

Financial markets are closely interrelated: analyzing the stock market it is important to take into account the trade market, and analyzing the bond market it is necessary to take into account the stock market. Meanwhile, all these market analyses are impossible without the currency market analysis. In order to assess the market situation and the relations between the different financial markets, intermarket analysis must be performed (Murphy, 1991).

With the development of the financial markets, the offered derivative instruments were improving, too, which, together with the exchange traded funds provide opportunities to split investment between the different countries or asset classes, without having to invest directly in the metals, raw materials, commodities or other physical assets. The broad investment diversification possibilities encourage searching for the efficient methods to help exploit the different financial markets interrelations.

The aim of this study is to assess the application opportunities of the intermarket analysis in the investment portfolio formation.

## 1 Statement of a problem

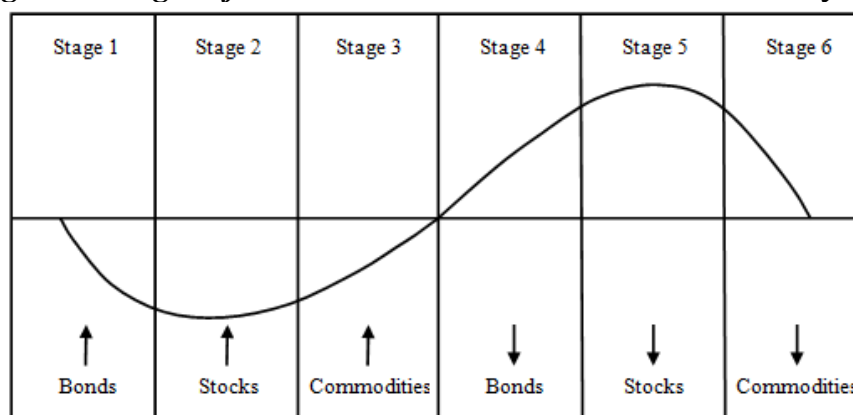
### 1.1 Intermarket analysis

Financial markets are characterized by the fact that the different phases of the business cycle reach the maximum return in the different asset classes. During the economic growth the largest return is generated by a risky asset class. During deflation the most profitable asset class is bonds. During recession the best asset class is money market instruments, while during inflation gold helps protect from the depreciation of money (Rowland, Lawson, 2012). In order to effectively manage the investment portfolio, according to the intermarket analysis, M. J. Pring(2016b) offered an ideal theoretical model of the business cycles, which was divided into six parts (see Fig. 1):

- Part 1 – bonds begin to rise (stocks and commodities are falling);
- Part 2 – stocks begin to rise (bonds continue to rise, commodities are falling);
- Part 3 – commodities begin to rise (all three markets are rising);
- Part 4 – bonds begin to fall (stocks and commodities continue to rise);
- Part 5 – stocks begin to fall (bonds continue to fall, commodities are rising);
- Part 6 – commodities begin to fall (all three markets are falling).

In each part the change in one of the three asset classes is taking place – in stocks, bonds or commodities.

**Fig. 1: Changes of the Financial Markets in the Business Cycles.**



Source: Pring (2016a)

During recession, interest rates and inflation reduce resulting the growth in bond prices. Bond prices rise and the business cycle reaches the bottom, then the attractiveness of shares increases. When economics begins to grow, it is necessary to protect from inflation and then it is invested in gold. Growing inflationary pressure increases the demand for various commodities, prices and interest rates. When the interest rates are increasing, it is important to reduce the bond part in the portfolio. When stock prices are approaching to the top, the whole value of the investments is advisable to be directed to the goods or other investment, protecting from inflation. When all the financial markets are falling, the safest investment is in money (Murphy, 1991).

The main intermarket analysis aspects are considered to be the business cycles and relations between the various financial markets. It will be discussed hereafter.

## **1.2 Financial markets relations**

The stock and bond markets are the largest in the world and attract the most attention from investors. These markets are also competing against each other. When the market is in an optimistic mood, investors prefer stocks. However, when pessimistic sentiment is dominated, more investment comes in bonds (Murphy, 2004). The stock and bond markets in economic recovery period are characterized by a negative correlation, though in the other stages of business cycle the stock and bond correlation is positive (Patoda, Jain, 2012). When uncertainty in the stock markets increases, the stock and bond markets have a very low or negative correlation, but lower uncertainty in the stock markets force the markets move in one direction. Considering this, the efficiency of asset allocation in the stock markets with uncertainty increases (Stivers, Sun, 2002).

Despite the fact that gold is recognized as an appropriate investment portfolio diversification tool, when the risk of recession in the financial markets increases, gold does not protect from the stock portfolio impairment (Chiang, Lin, Huang, 2013). Some commodities are characterized by the speculative phenomenon, when their correlation with the S&P 500 index increases with the growth in stock prices, while the bear market correlation decreases (Creti, Joëts, Mignon, 2012). Such correlation increase between the stock and commodity leads to greater volatility of the investment portfolio (Lombardi, Ravazzolo, 2013). In most cases in order to protect from inflation investors invest in gold or other commodities. However, on a positive long-term relationship between the stock market and commodity prices, it can be claimed that stocks are also a good asset class that helps protect against the inflation (Gregoriou, Kontonikas, 2010).

In order to reduce the portfolio impairment during the economic downturn and recession H. Browne proposed the 'Permanent Portfolio' strategy. This strategy diversifies the investment portfolio according to the four main phases of the economic cycle: prosperity, deflation, recession and inflation. The different asset classes bring the highest return in the different phases of the economic cycle. During prosperity the risky asset classes generate the largest return. During deflation the most profitable asset class is bonds. In recession the best asset class is money market instruments, while during inflation gold helps protect from the depreciation of money, so it is proposed to devote 25 percent of portfolio weight to all four asset classes (Rowland, Lawson, 2012).

The bond market is an important part of the intermarket analysis. The trend of the interest rates provides the information about inflation, stock market, current stage of the business cycle and the economic situation. The bond prices are the leading indicator that shows changes in the business cycle. However, the bond prices warn about the potential changes in the business cycle on average before 17 months (Murphy, 1991). It is important to emphasize that the bond return during recession is higher than during the growth period (Boyd, Mercer, 2010).

The dollar value changes impact on the US stock and bond markets. However, these markets are exposed by the US dollar through the commodity market. The US dollar has an impact on the commodity market, and the commodity market changes have an impact on the bond market, which in turn affects the stock market. Thus, the main link to the full range of the four financial markets is a relation between commodities and bonds (Murphy, 1991).

When the commodity prices are rising, the US dollar value is falling. However, along with the commodity prices the foreign currency values are rising, too (Murphy, 2004). In the developing countries the currency rates determine the crude oil prices, but gold is least affected by the currency rate fluctuation (Fahami, Haris, Mutalib, 2014). Oil prices in one-day period help forecast the currency exchange rate changes in the country in respect of the dollar value (Ferraro, Rogoff, Rossi, 2015). A negative correlation between gold and the US dollar results a positive correlation between gold and currencies, whose correlation with the US dollar is negative (Laïdi, 2009).

### 1.3 Business cycles and financial markets

Business cycles are closely related to the financial markets. The economic growth and contraction periods defined the limits, which explained the basis of the relations between stock, bond and commodity markets (Murphy, 2004). Also macroeconomic indicators are strongly related to a company's financial performance. Understanding the relations between these indicators can help predict how the companies' financial indicators will move when the economic situation in the country is changing (Stundžienė, Bliėkienė, 2012). Corporate stock prices are dependent on the financial indicators, market sentiments, investor attitudes and other factors. The relation between the macro-economic indicators and corporate financial indicators promotes to assess the impact of business cycles on stock prices before investing.

**Tab. 1: Financial market indicators in different stages of business cycle**

	Beginning of the cycle	Mid-cycle	End of the cycle	Recession
EPS ratios	Improving trend	Improving trend	Falling trend	Falling trend
Corporate margins	High	Peaking	Declining	Low
Credit spreads	Wide, contracting	Tight, stable	Tight, widening	Wide, unstable
M&A activity	Low	Moderate	High	No
Yield curve	Rates low, steep curve	Begin to rise, flat curve	Peaking, flat curve	Falling, steep curve
Volatility	High volatility, skew is falling	Low volatility, low skew	Volatility and skew are increasing	High volatility and high skew

*Source: Bilton et al. (2015)*

At the beginning of the business cycle there is a large and growing profitability of enterprises, the enterprises are valued relatively cheap in the market, the bond profitability is low, however, due to the higher corporate risk, the creditspreads between government bonds and non-government bonds is wide but tends to narrow down. In the middle of the business cycle corporate profitability and stock prices continue to grow, government bond interest rates start rising, resulting a small creditspreads, and the market is in peace, which is indicated by low volatility. At the end of the business cycle market volatility rises, corporate profitability and their value in the market start to decrease. Due to the increased risk the interest rates of corporate bonds start to increase, resulting the increasing credit spreads. At the end of the business cycle the activity in mergers and acquisitions reaches the maximum in the market. During recession the market volatility continues to increase, the corporate margins reach the minimum value, and stock prices continue to fall. Bond profitability begins to decline, and the creditspreads is increasing.

## 2 Methods

To carry out the intermarket analysis the relative correlations of different markets are applied. The relative graphs allow assessing the various financial market relations, their strengths and weaknesses, and the direction changes (Murphy, 2004). Table 2 provides the market relations and preliminary assessment according to J. J. Murphy (1991).

**Tab. 2: Intermarket bonds**

Relation	Assessment
Bonds / Stocks	When the ratio rises, bonds are purchased; when it falls, stocks are obtained.
Commodities / Stocks	When the ratio rises, commodities are purchased; when it falls, stocks are obtained.
Stocks / Currency	When the ratio rises, stocks are purchased; when it falls, currency is obtained.
Commodities / Bonds	When the ratio rises, commodities are purchased; when it falls, bonds are obtained.
Bonds / Currency	When the ratio rises, bonds are purchased; when it falls, currency is obtained.
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*Source: created by the authors*

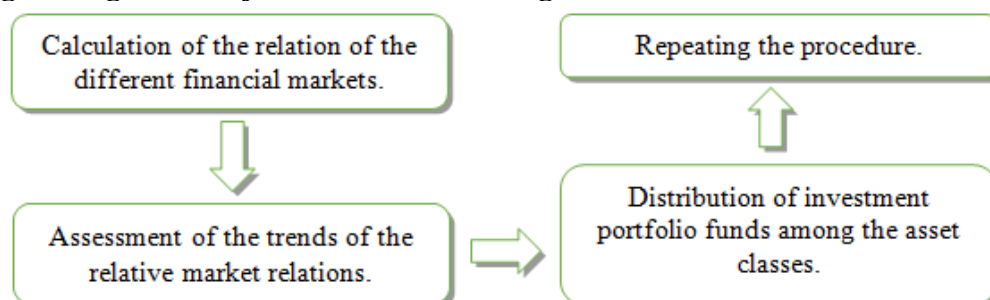
The movement of the securities prices is characterized by three trends: the rising direction, declining trend and consolidation. The market with direction provides the greatest opportunities to make profit. In order to exploit market movements a variety of strategies can be applied, but this study will seek to exploit the resulting market attractiveness and momentum. Momentum is assigned to the market trend indicator. The use of this methodology is quite simple, that is the investment is made in those securities, which prices tend to grow (Macijauskas, 2015). Falling stock prices increase their attractiveness. Undue decreased securities become more attractive, compared to the historical data and ratios. Such irrationality of the market and investment in relatively more attractive and cheaper assets help earn a higher return than the market's return (Brazauskas, 2014). Market movement direction  $I(t)$  is calculated by the following formula:

$$I(t) = \frac{P(t) - P_{(t-1)}}{P_{(t-1)}}$$

$P$  – ratio value at a given point of time.

Investment portfolios will be formed according to the following two strategies. To assess the market trend the ratios of the different markets are used.

**Fig. 2: Algorithm of the decision-making based on the intermarket analysis**



*Source: created by the authors*

The first step in the formation of the investment portfolio based on the intermarket analysis is calculation of the relation of the different financial markets. Relative financial market relations are calculated using two different markets rates.

The second step is to assess the trends of the relative market relations. The decision to include a particular class of assets in the portfolio is made considering the analyzed asset class relationships and trends with other asset classes (see Table 3).

**Tab. 3: Criteria of the assessment of the financial market attractiveness**

<b>Stocks</b>	<b>Bonds</b>	<b>Commodities</b>	<b>Currencies</b>
Bonds / Stocks	Bonds / Stocks	Commodities / Stocks	Stocks / Currencies
Commodities / Stocks	Commodities / Bonds	Commodities / Bonds	Bonds / Currencies
Stocks / Currencies	Bonds / Currencies	Commodities / Currencies	Commodities / Currencies

*Source: created by the authors*

According to the selected asset management strategy, within the stipulated time period, the procedure is repeated again (the fourth step). During the study, the composition of the investment portfolio is reviewed every year. During the period  $t$  the asset class weights are determined according to the ratio results of the  $t-1$  period.

The results of the investment portfolio are evaluated using a variety of quantitative methods: symmetric methods, tail risk assessing methods, downside risk assessing methods, downside risk assessing methods, risk-adjusted methods.

Annual investment growth rate is calculated by the following formula:

$$CAGR = \left( \frac{EV}{BV} \right)^{\frac{1}{n}} - 1 \quad (1)$$

$EV$  – investment value at the end of the period,  $BV$  – investment value at the beginning of the period,  $n$  – number of periods.

Standard deviation is calculated by the following formula:

$$\sigma_i = \sqrt{\frac{\sum_{i=1}^n (r_i - \mu)^2}{n}} \quad (2)$$

$r_i$  - return within a certain period of time,  $\mu$  - the average returns within a certain period of time.

Variation is calculated as the proportion of the standard deviation of the average return:

$$V = \frac{\sigma}{\mu} \quad (3)$$

Index tracking error is a statistical measure of risk, which shows the average dissemination of the investment portfolio return and the benchmark index return difference (Vardharaj, Fabozzi, Jones, 2004):

$$TE = \sigma_{(r_i - r_m)} \quad (4)$$

Index tracking error assesses the probability if the investment portfolio return is higher or lower than the market's return.

The data of the financial market is distributed outside the normal distribution, therefore to assess the tail risks the Cornish-Fisher value at risk improved methodology is applied,

where the VaR methodology calculation includes kurtosis and asymmetry assessment (Eling, Schuhmacher, 2006).

$$MVaR = \mu + z_{CF}\sigma \quad (5)$$

$$z_{CF} = z_c + \frac{(z_c^2 - 1)Skew}{6} + \frac{(z_c^3 - 3z_c)Kurt}{24} - \frac{(2z_c^3 - 5z_c)Skew^2}{36} \quad (6)$$

To evaluate the investment fund efficiency W. Sharpe (1966) proposed a ratio, which evaluates both return and risk. Sharpe ratio evaluates the additional return per risk per unit:

$$SR = \frac{\mu - r_f}{\sigma} \quad (7)$$

Sortino ratio is calculated by the following formula (Sortino, Van Der Meer, 1991):

$$S = \frac{\mu - \tau}{\sigma_n} \quad (8)$$

$\tau$  – the minimum acceptable return rate. In this study the minimum acceptable return rate corresponds to the risk-free interest rate.

Calmar ratio assesses the additional return per unit of maximum drawdown (Young, 1991):

$$CR = \frac{\mu - r_f}{D_{\max}} \quad (9)$$

$D_{\max}$  – the largest decline of the investment portfolio value over a certain period of time.

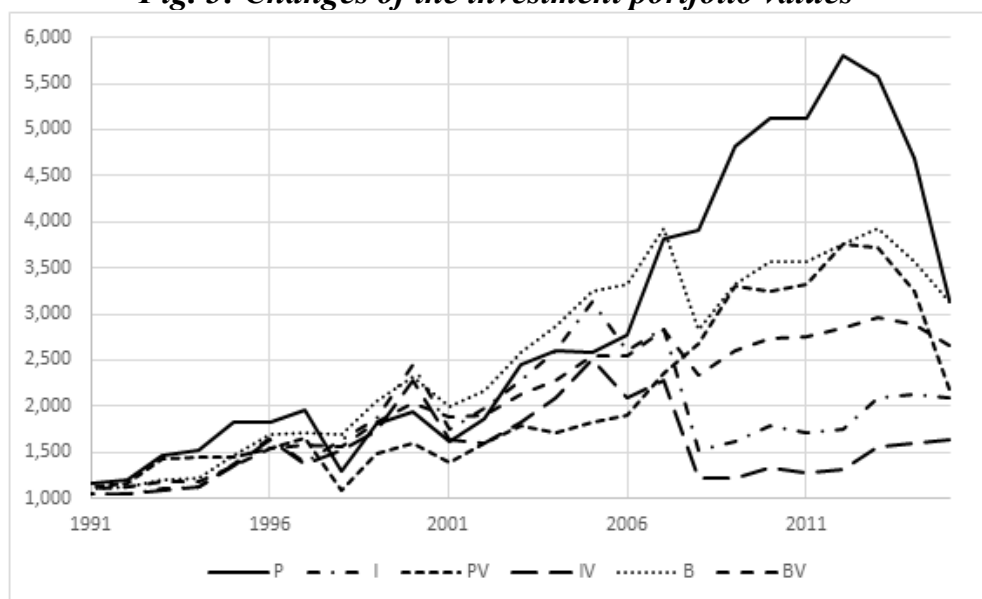
Information ratio expresses the average portfolio return above the benchmark return over a given period of time, divided from the differential return standard deviation (Dzikevičius, 2004):

$$IR_i = \frac{\mu - r_m}{\sigma_{(r_i - r_m)}} \quad (10)$$

### 3 Problem solving

The efficiency of the investment strategy is evaluated comparing the investment portfolios constructed according to the different strategies. In the study six different investment portfolios were made up. The momentum strategy was tested through the investment portfolio of the three major asset classes (I) and additionally including the US dollar index (IV). The investment portfolios based on the strategy of market attractiveness were made using three major asset classes (P), and additionally including the US dollar index (PV). For comparison, the basic investment portfolios were constructed with all markets with the same weights. B's investment portfolio consisted of the three main asset classes and BV's investment portfolio consisted of all four major asset classes. Considering the fact that the US dollar index reflects the cash value, it can be claimed that this portfolio was composed according to H. Browne's proposed 'Permanent Portfolio' strategy, where the investment is made into four asset classes in equal parts.

**Fig. 3: Changes of the investment portfolio values**



Source: made by the authors, MSCI, Bloomberg, Fusion Media Ltd.

At the beginning of the period (January 1st, 1991) the investment portfolio values were equivalent to 1. At the end of the period (December 31st, 2015) the highest value was found in the investment portfolio composed using the attractiveness strategy, but excluding the DXY index (P). The value of the investment portfolio rose to 3.152. A bit behind was the basic investment portfolio (B), which value increased to 3.126. The lowest return was obtained in the investment portfolios composed using the momentum strategy (I, IV), where the values increased to 2.086 and 1.627. Regardless of the chosen strategy, the involvement of the US dollar into the investment portfolio decreased the investment portfolio returns.

Figure3 shows that the results of the composed investment portfolios were different during the financial crisis period. All the formed portfolios suffered losses in 2001. The largest losses were found in the investment portfolios set up applying the momentum strategy. In 2002 recession in the stock market the most values of the investment portfolio were increasing, with the exception of the IV investment portfolio. The value of this portfolio was decreased by the falling US dollar. During the 2008 decline in the stock and commodity markets the investment portfolios based on the attractiveness strategy obtained positive returns, while all the other investment portfolios suffered losses. The largest losses were found in the investment portfolios formed using the momentum strategy. Their value fell to 46.70 per cent (see Table 5).

**Tab. 5: Assessment criteria of the investment portfolio efficiency**

	P	I	PV	IV	B	BV
CAGR (%)	4.70	2.98	3.17	1.97	4.66	3.99
Standard deviation (%)	18.31	17.11	16.00	16.87	11.84	8.08
Downside standard deviation (%)	14.989	16.259	13.578	15.373	9.858	6.065
VaR (%)	38.68	23.99	30.63	24.96	21.81	17.26
Maximum drawdown (%)	-34.02	-46.70	-34.02	-46.70	-27.93	-17.24
Coefficient of variation	2.88	3.70	3.58	4.75	2.21	1.88
Sharpe ratio	0.168	0.079	0.075	0.017	0.177	0.128
Sortinoratio	0.206	0.083	0.089	0.019	0.213	0.170
Calmar ratio	0.091	0.029	0.035	0.006	0.075	0.060
Information ratio	0.073	-0.069	0.013	-0.063		
Tracking error (%)	13.47	10.73	13.72	11.78		

Source: made by the authors, MSCI, Bloomberg, Fusion Media Ltd.



During the analyzed period the highest annual growth rate was found in a basic portfolio and the investment portfolio based on the market attractiveness, excluding the US dollar index. Depending on the assessment methodology, the risk of the other investment portfolios was different. The biggest symmetric risk and tail risk were distinguished in the investment portfolio based on the attractiveness strategy, excluding the currencies. The largest asymmetric risk was noted in the investment portfolio, which was formed according to the momentum strategy, excluding the currencies. In terms of risk and return ratio, the maximum efficiency was observed in the basic investment portfolios.

The investment portfolio performance was assessed using Sharpe, Sortino and Calmar ratios. According to these ratios the most efficient portfolios are basic and based on the market attractiveness, excluding the US dollar index. In terms of these relative criteria, the application of the momentum strategy was the least efficient. According to the information ratio and tracking error criterion the market attractiveness strategy is more effective than the momentum strategy, therefore, applying this strategy higher returns can be expected.

Summing up the results it can be claimed that the investment in equities, bonds and commodities in equal proportions is more effective solution than the investment in the market or in the reverse market. Including currency into the basic portfolio has reduced the risk, but due to the declined returns the efficiency also decreased. The results of the research show that the formation of the 'permanent portfolio' from the three asset classes is sufficiently effective in order to reduce the investment portfolio risk and to achieve a reasonable return.

#### **4 Discussion**

To perform the intermarket analysis financial market relations have been used. These relations are evaluated using the historical price fluctuations in the asset classes. Therefore, the technical analysis is most commonly applied together with the intermarket analysis (Murphy, 1991; Murphy 2004). The analysis of the financial market relations assesses the price divergence, convergence or other monitored indicators, which help to evaluate the potential price movement. Nevertheless, two strategies were selected to join the intermarket analysis with the strategies observing the market. A sufficient number of the empirical studies were carried on, what justifies that market trends help to achieve a higher return (Macijauskas, 2015). In the market there are the actives, which are unreasonably underestimated (Brazauskas, 2014), and this feature determines the application of the attraction strategy.

According to the survey results, it can be stated that none of the selected strategy were successful, and the results were worse than the results of the basal portfolio. This could be determined by an inappropriate choice of the portfolio formation period, because the study was carried out for one-year period of the investment portfolio formation. L. Macijauskas(2015) used monthly data in the application of the asset allocation and sliding averages, which helped him achieve higher returns than the comparable portfolios. Meanwhile, J. Murphy (1991; 2004) did not define the periods assessing the intermarket analysis, where he applied the indefinite periods. Thus, it can be stated that the usage of the annual data does not allow to assess the sudden and large market movements - changes, so does not have an effective use of the intermarket analysis options.

For the further development and analysis in this research field it is important to take into account the evident weaknesses. An improper selection of the analyzed period increases the

risk to miss the particular moment when the financial markets become relatively cheap compared to the other financial markets.

## Conclusion

Financial markets are closely related. When investing in stocks, it is important to take into account the commodity market, and investing in bonds, it is important to take into account the shares, while investing in any financial market is necessary to deal with the currency market analysis.

Financial markets are not only closely related, but due to the different relations, it is possible to achieve a positive return in the different economic cycle phases or to protect the investment portfolio from depreciation.

The results of the research have shown that investing in equities in equal proportions, bonds, commodities are more effective solution than investing in the market or in the reverse the market. The involvement of currency into the basic portfolio has reduced its risk, but due to the decreased returns the efficiency also fell down. 'Permanent portfolio' formation from the three asset classes is sufficiently effective in order to reduce the investment portfolio risk and to achieve a reasonable return. It is important to emphasize the fact that market tracking within the crisis periods resulted the greatest losses, and the formation of the investment portfolio in the 'reverse market' caused smaller losses or small profits. Investing in the cheaper financial markets allowed achieving the highest return, but due to the high volatility, this portfolio was not the most effective one.

The financial markets are linked with different strengths that depend on many factors. Therefore, it is important to continue analyzing the application possibilities of the financial markets relations in the investment portfolio formation and seeking for more effective solutions.

## References

- Bilton, J., Hood, M., Schöwitz, P., Lowe, J., Shairp, D., Albrecht, M., Li, B. (2015). GIM Solutions – GMAG: our 2015 year ahead views. *Investment Insights*, J. P. Morgan Asset Management, pp. 28.
- Boyd, N. E., Mercer, J. M. (2010). Gains from Active Bond Portfolio Management Strategies. *The Journal of Fixed Income*, vol. 19, no. 4, pp. 73-83.
- Brazauskas, M. (2014). Value investment portfolio formation by using Multiple Criteria Decision Making method. *Economics and management: current issues and perspectives*, vol. 33, no. 1, pp. 72-81.
- Chiang, S.-M., Lin, C.-T., Huang, C.-M. (2013). The relationship among stocks, bonds and gold: safe heaven, hedge or neither?. *International Conference on Technology Innovation and Industrial Management*, May 29-31, pp. 164-180.
- Creti, A., Joëts, M., Mignon, V. (2012). On the links between stock and commodity markets volatility. *CEPII*, WP No. 2012-20, pp. 37.
- Dzikevičius, A. (2004). Comparative Analysis of Risk Adjusted Procedures. *LŽUŲ mokslo darbai*, No. 64 (17), pp. 7.
- Eling, M., Schuhmacher, F. (2006). Does the choice of performance measure influence the evaluation of hedge funds?. *Working papers on Risk Management and Insurance*, No. 29.
- Fahami, N. A., Haris, S., Mutalib, H. A. (2014). An Econometric Analysis between Commodities and Financial Variables: The Case of Southeast Asia Countries. *International Journal of Business and Social Science*, vol. 5, no. 7(1), pp. 216-223.

- Ferraro, D., Rogoff, K., Rossi, B. (2015). Can oil prices forecast exchange rates? An empirical analysis of the relationship between commodity prices and exchange rates. *Journal of International Money and Finance*, vol. 54, pp. 116-141.
- Gregoriou, A., Kontonikas, A. (2010). The Long-Run Relationship Between Stock Prices and Goods Prices: New Evidence from Panel Cointegration. *Journal of International Financial Markets Institutions and Money*, no. 20(2), pp. 166-176.
- Laïdi, A. (2009). *Currency Trading and Intermarket Analysis*. New Jersey: John Wiley & Sons, Inc., p. 279.
- Lombardi, M., Ravazzolo, F. (2013). *On the correlation between commodity and equity returns: implication for portfolio allocation*. Bank of International Settlements, BIS Working Papers No. 420, p. 32.
- Macijauskas, L. (2015). *Tactical asset allocation based on irrationality of the financial markets participants*. Doctoral dissertation, Vilniaus Gedimino Technical University, Vilnius: Technika, p. 141.
- Murphy, J. (1991). *Intermarket Technical Analysis: trading strategies for the global stock, bond commodity, and currency markets*. United States of America: John Wiley & Sons, Inc., p. 282.
- Murphy, J. (2004). *Intermarket Analysis*. New Jersey: John Wiley & Sons, Inc., p. 270.
- Patoda, R., Jain, K. (2012). Assimilation between Bond Market and Stock Market. *Global Journal of Management and Business Research*, vol. 12, issue 20, pp. 43-54.
- Pring, M. J. (2016a). InterMarket Review. 2016, vol. 32, no. 8, p. 41.
- Pring, M. J. (2016b). *The Investor's Guide to Active Asset Allocation: Using Technical Analysis and ETFs to Trade the Market*. McGraw-Hill, p. 370.
- Rowland, C., Lawson, J. M. (2012). The Permanent Portfolio: Using Allocation to Build and Project Wealth. *AII Journal*, Feature: Portfolio Strategies, pp. 7-10.
- Sharpe, W. F. (1966) Mutual Fund Performance. *The Journal of Business*, vol. 39, no. 1, Part 2, pp. 119-138.
- Sortino, F. A., Van Der Meer, R. (1991). Downside Risk. *Journal of Portfolio Management*, vol. 18, pp. 27-31.
- Stivers, C., Sun, L. (2002). *Stock Market Uncertainty and the Relation between Stock and Bond Returns*. Federal Reserve Bank of Atlanta, working paper 2002-3, p. 38.
- Stundžienė, A., Blikiene, R. (2012). The impact of economic fluctuations on company results. *Business: Theory and Practice*, no. 13(1), pp. 5-17.
- Vardharaj, R., Fabozzi, F. J., Jones, F. J. (2004). Determinants of Tracking Error for Equity Portfolios. *Journal of Investing*, vol. 13, no. 2, pp. 37-47.
- Young, T. W. (1991). Calmar ratio: A smoother tool. *Managed money*, p. 40.

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