Are There Price Effects of Adding or Deleting Stock From the Stock Index?

DRAGANA DRAGANAC & MIROSLAV TODOROVIĆ

Abstract In this paper, we investigate the effects of stock indexing on its market price. The event study methodology is used to explore what happens with share price when stocks are added to or deleted from the market index S&P 500. The aim of the research is to investigate if there are abnormal returns, can they be anticipated by traders, what is their duration, and if the effects could be explained from the perspectives of neoclassical and behavioral finance. Several explanations of price dynamics after stock price (de)indexing are provided in the paper. Our results show that index effects declined a lot in recent years, both for the case of stock inclusions and exclusion.

Keywords: • stock price indexing • efficient market hypothesis • behavioral finance • event study

---

CORRESPONDENCE ADDRESS: Dragana Draganac, Ph.D., Assistant Professor, University of Belgrade, Faculty of Economics and Business, Street Kamenička 6, 11000 Belgrade, Serbia, e-mail: dragana.draganac@ekof.bg.ac.rs. Miroslav Todorović, Ph.D., Full Professor, University of Belgrade, Faculty of Economics and Business, Street Kamenička 6, 11000 Belgrade, Serbia, e-mail: miroslav.todorovic@ekof.bg.ac.rs.

https://doi.org/10.4335/2023.3.31 ISBN 978-961-7124-14-9 (PDF)
Available online at http://www.lex-localis.press.

1 Introduction

The traditional (neoclassical) financial theory first considered that events such as stock inclusion or exclusion from a stock market index cannot have an impact on its price, since such events do not affect fundamental indicators of the company (e.g. expected dividends, expected cash flows, growth rates of dividends and cash flows), nor do they affect the risk of cash flow realization (see, for example, Ross et al., 2015; Fama, 1970). Later, this conclusion of traditional finance theorists was corrected: although future cash flows would not be affected by stock indexing, investors' perception of risk could be changed since the stock inclusion in the index is considered as a form of recognition of the company's quality (Dhillon and Johnson, 1991; Jain, 1987). After indexing, the company is perceived as less risky by rational investors, which will result in a decrease in the required rates of return and an increase in share price (see, for example, Merton, 1987; Hegde and McDermott, 2003; Chordia, 2008). The reverse also applies in the case of stock being excluded from the index: required rates of return will go up, while share price will go down. According to efficient market hypothesis – EMH (Fama, 1970), which is one of the pillars of traditional (neoclassical) finance theory, in efficient markets all relevant information about firms is instantly incorporated into the stock price. Therefore, the stock price fully reflects all available information and there is no space for abnormal returns to appear. If inclusion (exclusion) does not convey new information, there will be no price changes. If new information about the firm is conveyed through the inclusion (exclusion) of its stock to the stock market index, there will be instant changes in share price, without the possibility to earn money.

Within the behavioral finance, where investor rationality and market efficiency are questioned or denied, price changes after indexing/deindexing are considered to be the result of numerous investor psychological biases. Behavioral finance theorists name these price changes as a phenomenon of tyranny of the index funds, while some of the biases and psychological explanations behind it are herd behavior, information cascades, cognitive dissonance, aversion to regret, and availability and representativeness bias. Herd behavior and information cascades (Avery and Zemsky, 1998; Bikhchandani, and Sharma, 2001) mean that investor, seeing that other investors started to buy stock added to the index, follow the crowd and do the same in order to avoid aversion to regret that will occur if they missed some profitable investment opportunity. Availability bias (Kahneman and Tversky, 1974) may lead to wrong decisions based only on recent information that remained in our minds as salient. For example, investors can only remember good outcomes from buying stocks that are added to stock index, while bad outcomes from passive investments from remote past are forgotten. Representativeness biases (Kahneman and Tversky, 1974) may result in wrong estimates of probabilities that some trading strategy, such as passive tracking of the stock index, will be successful.

Regarding empirical results, earlier studies confirmed that a stock's inclusion in an index is associated with significant positive abnormal returns, while exclusions from the index result in significant negative abnormal returns. Several explanations for the abnormal returns are offered. However, in recent years, empirical evidence suggests that abnormal returns declined over time and even disappeared.

The objectives of this paper are to investigate what happened to the index effect in the last three years, to identify and explain the reasons of observed results, and to test the weak form of EMH. To this end, we applied event study methodology and Wald–Wolfowitz runs test of randomness of returns to the sample of 54 companies, with 32 additions and 22 deletions from S&P 500 stock market index that occurred in the period from 2020 to 2022.

The remainder of the paper is organized as follows. Section 2 contains literature review. In section 3, we describe the applied methodology, data set and present the results. After that, in section 4 we analyse and discuss the results. Last section contains concluding remarks and future research directions.

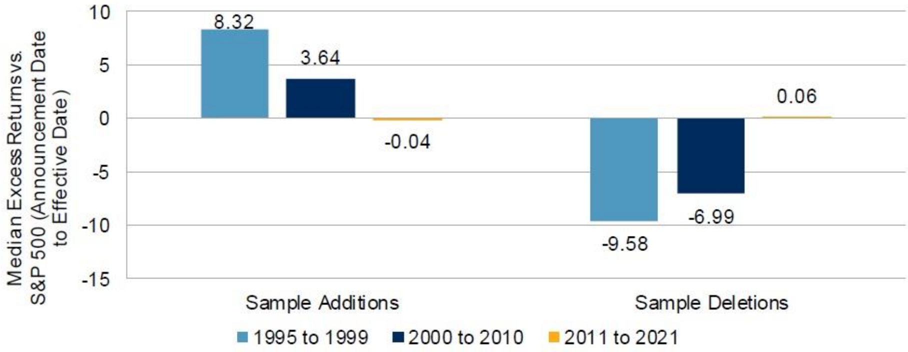
2 Literature overview

First studies about the price effects of indexing appeared in 1980s. Most papers investigate the price effects for S&P 500 market index, but there are also studies about price effects on the examples of other indices and other geographical areas. The earlier empirical studies find that, in the case of stock inclusion, there is significant positive abnormal return between 3% and 8% for different event windows (Shleifer, 1986; Harris and Gurel, 1986; Jain, 1987; Beneish and Whaley, 1996; Lynch and Mendenhall, 1997; Howard and Chan, 2002; Hacibedel and van Bommel, 2006). In some studies, (e.g. Masse et al., 2000) abnormal returns were detected even before any announcement of inclusion, which is the clear evidence of information leakage. The evidence of the duration of indexing effects are mixed: some studies find that price changes are temporary (Kasch and Sarkar, 2011; Zitman, 2006), while the others, such as Shleifer (1986) and Jain (1987), find that the price changes are permanent. On the other hand, Brealey (2000) does not find any significant effects of price inclusions.

There is no unique conclusion regarding the price effects of stock deletion from the market index. Brealey (2000) finds that there is significant negative cumulative abnormal return as of -4.5% and -2.0% for FTSE All-Share index and the FTSE 100 index, respectively. Jain (1987) notices the negative abnormal return of -1.16% for exclusion from S&P 500 index. Zitman (2006) observes temporary but significant negative abnormal return for AEX deletions.

The Index Effect has weakened significantly since 2011 (Renshaw, 2020). It can be observed from Figure 1 for S&P 500 additions and deletions.

Figure 1: The S&P 500 index effect declined over time



Source: Preston and Soe (2021).

The illustration shows that, during the period 1995-2001, median excess returns in the window between the announcement date and effective date faded away for additions (from 8.32% to only -0.04%. At the same time, negative abnormal returns associated with stock deletions disappeared, -9.58% to 0.06%. One possible explanation for the attenuation of the inclusion effect is that exchange-traded funds (ETF) market makers trade on price disparities as soon as they occur, eliminating any sustained positive or negative price deviations (Renshaw, 2020). If this is true, it also proves that ETF trading adds liquidity to the market.

There is no consensus in the literature about the reasons of observed abnormal returns during history. In addition to abnormal returns, studies have found other effects such as an increase in trading volume following the announcement of a stock inclusion in the index. The tracking of stock indexes has grown steadily in the meantime. The estimation from the end of 2021 is that USD 15.6 trillion is indexed or benchmarked to the index. Therefore, the recent findings of decline in the index effect are intriguing.

Price Pressure Hypothesis (Harris and Gurel, 1986; Blouin et. al, 2000) explains abnormal returns through the increased demand for the included stocks by hedge funds and other institutional investors whose stock portfolios are structured to track indices. However, these abnormal returns are temporary and the reversal will occur as soon as the index funds rebalance their portfolios. Ben Rephael et al. (2011) identify temporary price pressure on the example of mutual fund flows in Izrael, where 50% of the price changes is reversed in next 10 trading days. Lin (2018) finds the evidence of temporary positive/negative abnormal returns for additions/deletions from DJIA and increase in trading volumes in both cases. Downward Sloping Demand Curve Hypothesis introduced by Shleifer (1986) points out that, since index funds reallocate their portfolios to replicate the index, the increase in share price is permanent, which causes the demand curve for shares to be downward-sloping. Downward Sloping Demand Curve Hypothesis represents a departure from the traditional view that the demand curves are perfectly elastic and that stock trading can be done in large blocks at the prevailing stock price. Imperfect Substitute Hypothesis considers that, since it is difficult or even impossible to find perfect substitute for a given stock, demand curve is downward-sloping. Information Signaling Hypothesis (Jain, 1987) states that the inclusion (exclusion) of a stock in an index brings new valuable information about the quality of the company that was previously unknown to the market. The new information conveyed by the announcement of the inclusion is a kind of certification of the quality of the company, which results in a decrease in the perceived risk and required rates of investors. A more extreme interpretation of the Information Signaling Hypothesis refers to higher expected future cash flows; it can be expected that, as a result of the inclusion, the monitoring of the company's management is strengthened and analyst and media coverage increases, which induces managers to carry out more profitable investment projects with higher future FCFF than those that were realized before the inclusion (Denis et al., 2003). There is the asymmetry in media coverage between additions and deletions: additions are covered more intensively, so their recognition remains sometimes even after the stock is excluded from the index. Liquidity Hypothesis, introduced by Amihud and Mendelson in 1986, explain that a decrease in the perceived risk and required rates by investors could also be the result of a reduced premium for the risk of illiquidity of shares due to the possible higher liquidity of a given share after its inclusion in the index. However, in reality, these effects are negligible since most shares were already highly liquid even before inclusion in the stock market, since the firms were already listed at stock exchanges. The companies that became part of the stock market index may attract capital faster and grow at a higher rate. Greenwood and Sammon (2022) acknowledge disappearing index effects and provide several explanations: changing in compositions of additions and deletions, increase in average liquidity, which makes the market more able to absorb demand shocks, index migration, when stock was already the member of smaller/larger index before addition/deletion, increase in predictability of index change, and event-specific liquidity. In recent years, with the huge implementation of artificial intelligence (AI) prediction techniques, predictability of index change increased a lot. Lu and Ahmad (2019) find out contradictory results of decrease in stock price and trading volume, but increase in returns volatility after the announcement that the stock will be added to the Malaysian stock index. The opposite was the case when stock was deleted from the index. They offered explanation from behavioral finance point of view about higher investors' opinion divergence for added than for deleted stocks. Qin and Signal (2015) state that indexing negatively affects market efficiency and causes more intense post-earnings-announcement drift and larger deviations of stock prices from the random walk.

3 Research

The event study methodology is used in the paper. This methodology is introduced by Ball and Brown (1968), while MacKinlay (1997) explains how it can be applied on financial market data to investigate the effects of different events, such as dividend announcement, financial result announcement, mergers and acquisitions (M&A), spin offs and other company restructuring techniques, stock splits, the addition or deletion of stocks from the index, on the firm value. Since then, event study methodology is widely used to analyze the impact of various events on stock price and firm value, to investigate if market participants could anticipate the event, what is the duration of the event and how quickly new information is integrated into stock price. Stock prices often react to the announcement of the event even if the event is not realized. Therefore, the announcement of the event is the event per se. Two important days for studying effects of the event are announcement day (AD) and effective day (ED). Even before announcement day, market participants can anticipate the event and abnormal returns can occur. Event window is often taken as a period between announcement day and effective day, or between announcement day and several days after the effective day. In order to calculate "normal" returns, we need the estimation window, which is a period before the announcement day or even before any anticipation of the event. The estimation window should not contain any relevant event that could affect share price. The length of the estimation window differs from study to study, but most often it is between 120 and 250 trading days. When "normal" returns are calculated using market model, it is important to use long enough estimation window to obtain the plausible estimations of the beta coefficient, as a measure of systematic risk.

In previous studies about the index effects, there is no consensus about the length of the event window. Namely, event windows span from (AD – 1, ED) to (AD – 10, ED + 60). From the S&P 500 methodology, it is not completely clear when the announcement of stock inclusion or exclusion occurs. Announcement occurs from two to 10 trading days before the effective date of inclusion (exclusion), where the number of days are shorter for exclusions from the index. Therefore, apart from the fact that the studies mentioned in literature review covered different historical periods, different samples of companies and different methodological nuances, most of the differences in the results can be explained by the different event windows used. Finally, due to the aforementioned differences in the number of days from the announcement to the effective inclusion or exclusion day, it is possible that the studies do not always consistently capture daily abnormal returns, which results in the event not being captured in the same way for all the stocks in the sample.

In this paper, we opted for the event window (ED - 10, ED + 10), but were also analyzing shorter event windows: (ED - 10, ED - 1), (ED - 5, ED - 1), (ED + 1, ED + 5), (ED + 1, ED + 10). We used trading, not calendar days. Additionally, abnormal return on the effective day is calculated and analyzed. In order to calculate abnormal returns, we used market model, given in equation (1):

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \tag{1}$$

where AR_{it} is the abnormal stock return of the company *i* at day *t*, R_{it} is the realized stock return of the company *i* at day *t*, the expression $\hat{\alpha}_i + \hat{\beta}_i R_{mt}$ is the "normal" rate of return according to the CAPM model, where $\hat{\beta}_i$ is the estimation of the beta coefficient, while R_{mt} is the rate of return on S&P 500 market index.

Average abnormal returns (AAR), cumulative abnormal return (CAR) and cumulative average abnormal return (CAAR) are calculated using the formulas (2), (3) and (4), respectively:

$$AAR = \overline{AR}_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \tag{2}$$

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \tag{3}$$

$$CAAR(t_1, t_2) = \overline{CAR}(t_1, t_2) = \sum_{t=t_1}^{t_2} \overline{AR}_t \tag{4}$$

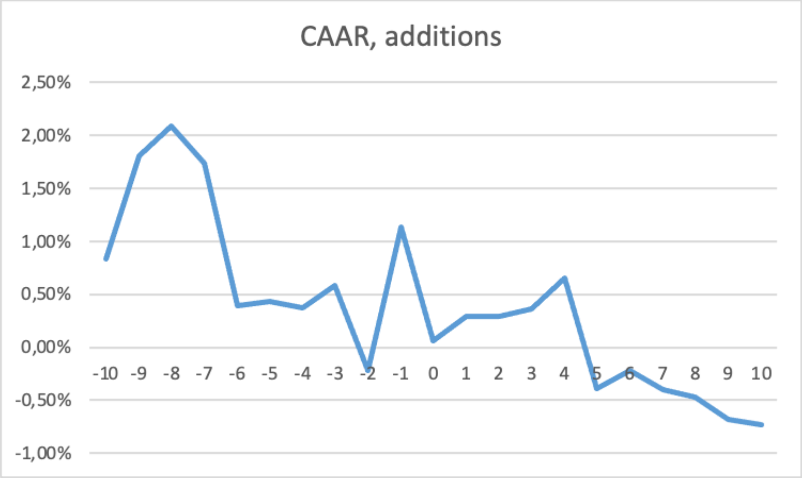
We use Wald–Wolfowitz runs test to test for the weak form of the efficient market hypothesis. This test checks whether stock returns follow the random walk, i.e. whether future stock returns are independent from the past ones. If this is the case, the weak form of EMH holds, and vice versa. In this paper, we modify Wald–Wolfowitz runs test by checking the randomness of abnormal returns in the event window (ED - 10, ED + 10).

Our sample includes 54 companies that were recently included or excluded from S&P 500: all analyzed inclusions and exclusions occurred in the period between April 2020 and November 2022. The reason for analyzing last 2.5 years is to check if the trend of disappearing of stock index effect continues. Data were obtained from Yahoo Finance web site. We analyzed 32 additions and 22 deletions from the S&P 500. Analyzed companies belong to different industries. All 22 companies from our sample of deleted stocks are the companies that are excluded from S&P 500 due to the market capitalization change. The obvious reason why we do not analyze the companies that are excluded from

S&P 500 as a result of acquisitions or bankruptcies is there are no market data after the effective day due to the delisting from stock exchanges.

Figure 2 presents the graph of the levels of CAAR for the event window (ED - 10, ED + 10).

Figure 2: Cumulative average abnormal return for stocks added to S&P 500, event window (ED - 10, ED + 10)



Source: Authors' calculation.

The results about the mean values of cumulative abnormal returns and their statistical significance for stocks added to the S&P 500 index for different event windows are presented in the Table 1.

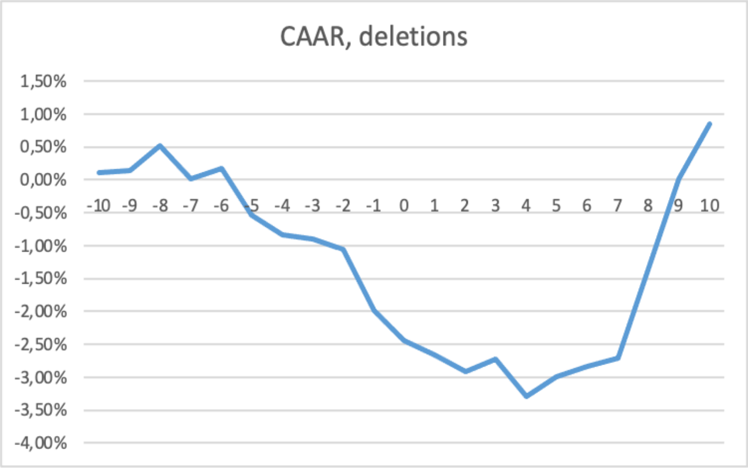
Table 1: (Cumulative) abnormal returns for S&P 500 additions

Event window	Mean	t statistics	Significance
(ED - 10 , ED - 1)	1.13%	0.99	
(ED - 5 , ED - 1)	0.74%	0.67	
ED	-1.07%	-2.21	***
(ED + 1 , ED + 5)	-0.45%	-0.50	
(ED + 1, ED + 10)	-0.79%	-0.64	
(ED - 10, ED + 10)	-0.73%	-0.43	

Notes: Two-tailed t-test test statistics is reported. The asterisks *** and ** indicate 1% and 5% significance level, respectively.
Source: Authors' calculations.

Figure 3 shows the movement of CAAR in the event window (ED - 10, ED + 10) for the companies that are excluded from S&P 500 stock market index.

Figure 3: Cumulative average abnormal return for stocks deleted from S&P 500, event window (ED - 10, ED + 10)



Source: Authors' calculations.

Table 2 presents the results about the mean values of cumulative abnormal returns and their statistical significance for stocks deleted from the S&P 500 stock market index for different event windows.

Table 2: (Cumulative) abnormal returns for S&P 500 deletions

Event window	Mean	t statistics	Significance
(ED - 10 , ED - 1)	-1.99%	-0.92	
(ED - 5 , ED - 1)	-2.15%	-1.94	
ED	-0.45%	-0.66	
(ED + 1 , ED + 5)	-0.55%	-0.54	
(ED + 1, ED + 10)	3.29%	1.33	
(ED - 10, ED + 10)	0.86%	0.24	

Notes: Two-tailed t-test test statistics is reported. The asterisks *** and ** indicate 1% and 5% significance level, respectively.
Source: Authors' calculations.

By performing Wald–Wolfowitz runs test, we obtained the results presented in Table 3 and 4.

Table 3: Wald–Wolfowitz runs test of abnormal returns randomness, additions

number of runs		number of days	
positive	6	positive	10
negative	7	negative	11
total	13	total	21
number of expected runs			11.476
stdev			2.227
z-statistics			0.684
p-value			0.247

Notes: Z-statistics shows Wald–Wolfowitz runs test statistics.
Source: Authors' calculations.

Table 4: Wald–Wolfowitz runs test of abnormal returns randomness, deletions

number of runs		number of days	
positive	3	positive	11
negative	3	negative	10
total	6	total	21
number of expected runs			11.476
stdev			2.228
z-statistics			-2.458
p-value			0.993

Notes: Z-statistics shows Wald–Wolfowitz runs test statistics.
Source: Authors' calculations.

It is important to emphasize that Wald–Wolfowitz runs test can be used for testing only the weak form of EMH.

4 Discussion

The results related to the sample of stocks added to S&P 500 are as follows. Cumulative abnormal return between announcement day and the day before the effective day, i.e. in the event window (ED - 10, ED - 1), has a positive value of 1.13%, but is not significantly different from 0. The same conclusion applies for the shorter event window (ED - 5, ED - 1), when cumulative abnormal return has even lower value of 0.74% and is not statistically significant. These results are in line with newer findings that price index effects faded away, such as Greenwood and Sammon, 2022, Preston and Soe, 2021, Renshaw, 2020, and Brealey, 2000. On the other hand, the significant abnormal return occurs on the effective day. This result may seem counterintuitive since it is expected that, due to the increased demand of the investors who waited the effective index inclusion day to buy the stock, positive abnormal return be realized. By more detailed looking into data, it can be observed that there is significant positive average abnormal return of 1.35% on the day before the effective day. This suggests that there are market agents who perform the rebalancing of the portfolios just before the effective stock inclusion day, to avoid regret aversion, whose activities significantly affect market prices and result in abnormal returns. Steady increase in CAAR in period (ED – 10, ED – 8) indicate that there are investors who anticipate index inclusion and start to buy early after whom other investors start to show herd behavior. All this results about significant positive (cumulative) abnormal returns are in line with old findings (such as Harris and Gurel, 1986; Blouin et. al, 2000) that there are stock index effects, which are temporary and reversals occurafter approximately 15 trading days. In both windows after the effective date, abnormal returns are negative, but insignificant. Negative abnormal returns can be interpreted as mild correction of a weak overreaction that happened before the effective date. Explanations offered by Greenwood and Sammon (2022) that could be applicable to our results are increase in average liquidity of stock markets, which makes the market more able to absorb demand shocks, and increase in predictability of index change due to wide use of AI prediction models.

The results presented in Table 2 show that there are no price effects of deleting stocks from S&P 500 index. The abnormal returns in the event windows (ED - 10, ED - 1), (ED - 5, ED - 1) and at the effective day are insignificantly negative. In the window (ED + 1, ED + 5), i.e. after the deletion of the stock from the S&P 500 index, cumulative abnormal return is still negative, though insignificant. In the longer event window (ED + 1 , ED + 10), cumulative abnormal return becomes positive, but insignificant. It is worth noting that, in the event window (ED - 10, ED + 4), cumulative average abnormal return has a very high negative value of -3.29%, which is statistically significant. These results could be interpreted in the following manner. Investors are selling stocks that are announced to be excluded from the index. Afterwards, when the price dropped enough, there are investors who start buying them. However, these trading activities do not have significant impact on abnormal returns.

As we already noted, all companies in our sample of stocks excluded from S&P 500 are those that are excluded due to market capitalization change. However, if we include in the sample the companies that went bankrupt or were acquired, using the data till the effective day, i.e. the day of delisting, our results and conclusions might be different.

Runs test indicate that stock abnormal returns are random both for the sample of stocks added to the S&P 500 index and for the sample of stocks deleted from the index. This is the evidence that only the weak form of the EMH holds and that future abnormal returns do not depend on past abnormal returns. However, it must be noted that since abnormal returns are not significantly different from 0, further test of semi-strong form of EMH need to be conducted.

5 Conclusions

In this paper, we analysed if there are price effects of the stock addition and deletion from the S&P 500 stock market index and if there is a possibility for traders to earn abnormal returns. Additionally, our goal was to test the weak form of the efficient market hypothesis. We used a sample of 54 companies that were added or deleted from S&P 500 index in last 2.5 years. The conclusion is that index effects disappeared both for inclusions and exclusions from the index, when considering the largest analyzed event window of (ED - 10, ED + 10). However, it is clear that investors perform rebalancing of their portfolios before the effective day, which results in significant abnormal returns in shorter event windows, both for addiditon and deletions. Although abnormal returns in our sample are lower than abnormal returns noticed in early studies on this topic, they have not disappeared completely, as some of the recent studies suggest. Therefore, there is still room for investors to earn abnormal returns by careful analyzing and trading with stocks that are going to be added or deleted from S&P 500 index, which is important message for portfolio managers. Wald–Wolfowitz runs test indicated that abnormal returns follow the random walk, which means that technical analysis is not useful: abnormal returns cannot be predicted on the basis of historical abnormal returns. The limitation of the research is that sample of deleted stocks do not include companies that are deleted because of bankruptcy or M&A activities, but only those whose market capitalization changed. The direction for further research is severalfold. The detailed analysis of the reasons for the stock inclusion in the S&P 500 can be performed. It can be taken into consideration whether the stock that is excluded from S&P 500 became a member of some other stock market index as well as whether the stock included in S&P 500 previously was the member of some smaller capitalization stock market index. The analysis of the indexing effect can be conducted on the examples of other stock market indices, such as the family of Russell indices and indices of less developed stock markets.

Acknowledgment:

The authors acknowledge support from the Ministry of Education, Science and Technological Development of the Republic of Serbia.

References:

Amihud, Y. & Mendelson, H. (1986) Asset pricing and the bid-ask spread, *Journal of financial Economics,* 17(2), pp. 223–249.

Avery, C. & Zemsky, P. (1998) Multidimensional Uncertainty and Herd Behavior in Financial Markets, *American Economic Review*, 88(4), pp. 724-748.

Ball, R. & Brown, P. (1968) An Empirical Evaluation of Accounting Income Numbers, *Journal of Accounting Research*, 6, pp. 159-178.

Beneish, M. & Whaley, R. (1996) An anatomy of the S&P game: the effects of changing the game, *Journal of Finance*, 51(5), pp. 1909-1930.

Ben-Rephael, A., Kandel, S. & Wohl, A. (2010) The Price Pressure of Aggregate Mutual Fund Flows, *Journal of Financial Quantitative Analysis*, 46(2), pp. 585-603.

Bikhchandani, S. & Sharma, S. (2001) Herd Behavior in Financial Markets: A Review, *IMF working paper*, available at: https://www.elibrary.imf.org/view/journals/001/2000/048/001.2000.issue-048-en.xml (December 16, 2022).

Blouin, J., Raedy, J. & Shackelford, D. (2000) The impact of capital stock price reactions to S&P 500 inclusion, *NBER working paper*, no 8011.

Brealey, R. (2000) Stock prices, stock indexes and index funds, *Bank of England Quarterly Bulletin*, 40, pp. 61-69.

Chan, H. W. H. & Howard, P. F. (2002) Additions to and Deletions from an Open-Ended Market Index: Evidence from the Australian All Ordinaries, *Australian Journal of Management*, 27(1), pp. 45–74.

Chen, H., Gregory N. & Singal, V. (2004) The Price Response to S&P 500 Index Additions and Deletions: Evidence of Asymmetry and a New Explanation, *Journal of Finance*, 59(4), pp. 1901-1930.

Chordia, T. (2008) Liquidity and Returns: The Impact of Inclusion into the S&P 500 Index, In: Lhabitant, F.S. & Gregoriou, G. N. (ed.) *Stock market liquidity: Implications for market microstructure and asset pricing* (Hoboken, New Jersey: John Wiley and Sons, Inc.), pp. 359-386.

Denis, D., McConnell, J., Ovtchinnikov, A. & Yu, Y. (2003) S&P 500 index additions and earnings expectations, *Journal of Finance*, 58(5), pp. 1821-1840.

Dhillon, U. & Johnson, H. (1991) Changes in the Standard and Poor's 500 list, *Journal of Business*, 64(1), pp. 75-86.

Fama, E. F. (1970) Efficient Capital Markets: A Rewiew of Theory and Empirical Work, *Journal of Finance,* 25(2), pp. 383-417.

Greenwood, R. & Sammon, M. C. (2022) The disappearing index effects, *NBER working paper*, no. 30748, available at: https://www.nber.org/papers/w30748 (December 15, 2022).

Hacibedel, B. & van Bommel, J. (2006) Do emerging markets benefit from index inclusion?, *Money Macro and Finance (MMF) Research Group Conference*.

Harris, L. & Gurel, E. (1986) Price and volume effects associated with changes in the S&P500 list: new evidence for the existence of price pressures, *Journal of Finance*, 41(4), pp. 815-829.

Hegde, S. & McDermott, J. (2003) The liquidity effects of revisions to the S&P 500 index: An empirical analysis, *Journal of Financial Markets*, 6(3), pp. 413-459.

Yahoo Finance web site, available at: https://finance.yahoo.com/ (November 18, 2022).

Jain, P. (1987) The effect on stock price of inclusion or exclusion from the S&P 500, *Financial Analysts Journal*, 43(1), pp. 58-65.

Kahneman, D. & Tversky, A. (1974) Judgment under Uncertainty: Heuristics and Biases, *Science*, 185(4157), pp. 1124-1131.

Kasch, M. & Sarkar, A. (2011) *Is There an S&P 500 Index Effect?* (New York: Federal Reserve Bank of New York Staff Reports).

Lin, E. C. (2018) The effect of dow jones industrial average index component changes on stock returns and trading volumes, *The International Journal of Business and Finance Research*, 12(1), pp. 81-92.

Lu, M. P. & Ahmad, Z. (2019) Impact of additions and deletions from stock index in malaysia: the role of opinion divergence theory, *International Journal of Business and Society*, 20 (2), pp. 709-729.

Lynch, A. & Mendenhall, R. (1997) New evidence on stock price effects associated with changes in the S&P 500 indeks, *Journal of Business*, 70(3), pp. 351-383.

Masse I., Hanrahan, R., Kushner, J. & Martinello, F. (2000) The effect of additions to or deletions from the TSE 300 index on Canadian share prices, *Canadian Journal of Economics*, 33(2), pp. 341-359.

MacKinlay, A. C. (1997) Event Studies in Economics and Finance, *Journal of Economic Literature*, 35(1), pp. 13-39.

Merton, R. C. (1987) Presidential address: A simple model of capital market equilibrium with incomplete information, *Journal of Finance*, 42(3), pp. 483-510.

Preston, H. & Soe, A. M. (2021) *What Happened to the Index Effect? A Look at Three Decades of S&P 500 Adds and Drops*, available at: https://www.spglobal.com/spdji/en/research/article/what-happened-to-the-index-effect-a-look-at-three-decades-of-sp-500-adds-and-drops/ (November 16, 2022).

Qin, N. & Signal, V. (2015) Indexing and Stock Price Efficiency, *Financial Management*, 44(4), pp. 857-904.

Renshaw, A. (2020) The Weakening Index Effect, *The Journal of Index Investing*, 11(1), pp. 17-31.

Ross, S., Westerfield, R. & Jordan, B. (2015) *Fundamentals of Corporate Finance* (New York: McGraw Hill).

Shleifer, A. (1986) Do demand curves for stocks slope down?, *Journal of Finance*, 41(3), pp. 579-590.

Zitman, A. (2006) *The price and volume effects around changes in the composition of the AEX-index,* (Amsterdam: Universiteit van Amsterdam).