FINANCIAL SCIENCES
NAUKI O FINANSACH

Financial Sciences. Nauki o Finansach
Year 2024, Vol. 29, No. 1
ISSN 2449-9811
journals.ue.wroc.pl/fins

Changes in the Composition of the WIG20 and mWIG40 Indices and the Operational Performance of Newly Added Companies

Ewa Blaszke

Wroclaw University of Economics and Business

e-mail: ewa.blaszke@ue.wroc.pl

ORCID: 0000-0002-0194-034X

Quote as: Blaszke, E. (2024). Changes in the Composition of the WIG20 and MWIG40 Indices and the Operational Performance of Newly Added Companies. *Financial Sciences*, *29*(1), 13-23.

DOI: 10.15611/fins.2024.1.02

JEL: G14, G15, G32, G41

Abstract

Aim: This article investigates whether the transition of companies from the mWIG40 index to the more prestigious WIG20 index affects their operational efficiency.

Methodology: The study analyzes 17 companies that transitioned from mWIG40 to WIG20 between 2000 and 2020. Four operational efficiency indicators were calculated for each company in the four quarters preceding and following the index change. The *t*-Student test was applied to determine whether this shift had a statistically significant impact on operational performance.

Findings: The analysis did not reveal statistically significant changes in the majority of the examined operational efficiency indicators following the transition. The exception was the net income on sales/total revenue ratio, which demonstrated statistically significant differences in certain quarters after the index change.

Implications: These findings support the hypothesis that the transition of a company from the mWIG40 index to WIG20 does not lead to an improvement in its operational results. The results suggest that investors should carefully evaluate other factors when interpreting index transitions as signals of improved corporate performance.

Originality/value: This study contributes to the existing literature by providing empirical evidence on the relationship between stock index transitions and operational performance in the Polish capital market, addressing a relatively underexplored research area.

Keywords: stock index composition, company's financial performance, operational performance

1. Introduction

Since 1986, research on the price reactions of stocks following their addition or removal from popular market indices has been regularly published in leading scientific journals. Pioneering contributions in this field, such as the studies by Shleifer (1986), and Harris & Gurel (1986), focused primarily on the implications of changes in the composition of the Standard & Poor's (S&P) 500 index throughout the late 1980s and 1990s. It was not until early this century that studies began exploring other stock market indices. More recent analyses have expanded beyond merely examining the price effects of index changes to include other stock characteristics such as liquidity, risk, and operational efficiency.

2. Review of Theories Regarding the Effects of Index Changes

According to the vast majority of studies, after the announcement of a new index composition there is a significant and well-documented increase in the stock prices of the newly included companies, while those removed experience a decrease in their stock prices. The literature offers several theories and explanations to account for this phenomenon, commonly referred to as the 'index inclusion effect'. These explanations can generally be classified into two broad categories: demand-based and information-based theories.

The proponents of demand-based theories argue that a company’s inclusion in an index does not provide the market with new information about its financial condition or future prospects. Instead, they contend that the price reaction is driven by the activities of index-tracking investors who generate upward pressure on the stock price, leading to positive abnormal returns around the inclusion date. However, researchers continue to debate whether the price changes resulting from adjustments in index composition are permanent or temporary.

Among those advocating the long-lasting nature of price changes was Shleifer (1986), who introduced the downward-sloping demand curve hypothesis, also known as the imperfect substitute hypothesis. Most valuation models based on the efficient market hypothesis (e.g. CAPM, APT) assume that demand curves for stocks are horizontal or nearly horizontal, based on the premise that substitutes are readily available for any given stock. However, for shares issued by companies newly included in an index, finding substitutes can be nearly impossible. The inclusion of a company in an index generates additional demand from investors, including index-tracking institutions such as index funds. These investors exert upward pressure on stock prices, resulting in a negatively sloped demand curve. Shleifer contended that the price changes resulting from a company's addition to an index were permanent. Conversely, other authors, including Harris & Gurel (1986) and Vespro (2006), argued that the temporary price imbalances following the announcement of a new index composition quickly subside, and the stock prices of newly included companies revert to their previous levels.

The downward-sloping demand curve hypothesis is not the only explanation for the index effect. Alternatively, the informational hypothesis suggests that a firm’s entry into an index might signal industry leadership or improved management quality (Jain, 1987). Denis et al. (2003) set out to assess the validity of this hypothesis by analyzing projected and actual profits for firms newly added to the S&P 500. They discovered significant increases in both expected and realized profits following their inclusion, and suggested that the causal relation between a company’s performance and its addition to the index could go in two directions. Index creators might select a company based on confidential information anticipating future performance improvements. Conversely, becoming a member of the index could enhance a firm's performance due to increased managerial scrutiny, which in turn encourages managers to intensify their efforts to improve profitability.

In his study, Cai (2007) explored the informational hypothesis by analyzing price and trading volume changes in companies similar to those newly included in the S&P 500. These firms were comparable in

terms of industry and size to the new index members, offering a unique advantage by eliminating the bias of excess demand from index-tracking investors. Cai (2007) noted a positive price reaction in these companies, emphasizing that a company's inclusion in the index serves as a positive informational signal about its future prospects and those of its industry. This finding suggests that investors may view index inclusion as an endorsement of the company's industry leadership, possibly reflecting the superior analytical capabilities of the index creators.

The liquidity hypothesis, closely related to the informational hypothesis, was tested by Chen et al. (2004), who noted an asymmetric price reaction following changes in the S&P 500 index. This reaction was characterized by a consistent increase in the prices of companies newly added to the index, but without the expected decline in the prices of stocks of those removed. This observed asymmetry is attributed to asymmetrical changes in investor awareness. When a company is added to the index, there is an increase in the information available about it, leading to enhanced stock liquidity. As investors gain more insight into the actual condition and prospects of the new index member, their required rate of return decreases, thus pushing stock prices up. Conversely, the removal of a company from the index does not significantly reduce the information available about it, or any reduction is minimal. As a result, losing index membership does not lead to a decrease in stock prices. Chen et al. (2004) argued that increased information availability about a company results in heightened market surveillance, reduced information asymmetry, improved access to capital markets, and reduced costs of inadequate diversification, echoing the insights of Merton (1987).

Another hypothesis explaining the inclusion effect was proposed by Merton and is commonly known as the investor recognition hypothesis. It suggests that if investors are only familiar with a limited set of stocks, their portfolios will lack sufficient diversification, leading them to demand a premium for bearing unsystematic risk, referred to as the shadow cost. When a company is added to an index, its stocks are introduced to a broader market audience, enabling more investors to recognize and potentially invest in them. This broader investor recognition allows for a reduction in the perceived risk, thus reducing the shadow cost. Consequently, investors will require a lower rate of return on their investments, which translates into higher stock prices for newly added companies.

Gygax & Otchere (2010) also examined price reactions following revisions to the S&P 500 composition, focusing on companies that remained listed despite index changes. They hypothesized that adding new companies to the S&P 500 might validate the attractiveness of those already included within the same industry. This assumption was based on earlier research by Cai (2007), who found that non-indexed companies in the same industry as newly added firms also reacted to changes in the index composition. Gygax and Otchere suggested that similar reactions might occur among existing indexed firms within those industries. The study showed that indexed companies typically have higher liquidity, which means new information is reflected more quickly in their stock prices. The results indicated that current index members experienced negative excess returns when the index composition was revised. However, any negative impacts due to price pressure were often mitigated by positive industry-level information and momentum effects. In cases of index exclusion, the adverse effects were more pronounced for companies in the same industry as the excluded firms, highlighting the significant informational content of index changes, although portfolio rebalancing effects generally outweighed industry information effects.

Research on the repercussions of changes in index composition on stock prices has broadened to include the effects of revisions across various global stock market indices. Numerous studies confirm the validity of previously discussed hypotheses. For example, the hypothesis that proposes downward--sloping demand curves for stocks of newly added firms is supported by investigations involving Japanese indices such as Nikkei 500 (Liu, 2000) and Nikkei 225 (Hanaeda & Sarita, 2003), as well as the British FTSE 100 (Fernandes & Mergulhao, 2016; Mase, 2007). Similarly, studies based on indices such as Russell 2000 (Biktimirov et al., 2004), S&P Small Cap 600 (Shankar & Miller, 2006), TSE 300 (Chung & Kryzanowski, 1998), and ISE-100 and ISE-30 (Bildik & Gulay, 2008) provided supporting evidence.

Meanwhile, the price pressure hypothesis was validated by other studies, e.g. Masse et al. (2000) and Wang et al. (2015), and the informational hypothesis was confirmed by research on the FTSE 100 index revisions (Gregoriou, 2006). Research by Becker-Blease & Paul (2006) and Biktimirov & Li (2014) substantiated the liquidity hypothesis.

Afego (2017) conducted a detailed literature review on the effects of composition changes in stock market indices, noting that most recent studies have focused on quantifying the impact of these changes on variables other than price or trading volume, primarily in the US and a few other developed markets in Europe and the Asia-Pacific. In his view, despite the increasing number of indices that include emerging markets, research on these markets has been relatively neglected. It is also noteworthy that there is a growing focus on the price effects associated with changes in the composition of sustainability indices, including those from emerging markets. For example, Gok & Goksen (2023) investigated the effects of composition changes in the XUSRD (Borsa Istanbul Sustainability Index). They observed asymmetrical market reactions on the announcement days: trading volume increased for the included firms and decreased for the excluded ones, but only the effects on the deleted firms were statistically significant. Nevertheless, they found that the impact of index alterations was only temporary, which, according to Gok & Goksen (2020), supports the price pressure hypothesis.

Białkowski & Sławik (2021) also observed that most studies primarily focus on conventional stock market indices and target mature financial markets. Although several studies have examined the impact of events on sustainability indices (e.g. Cheung, 2011; Consolandi et al., 2009; Hawn et al,. 2018; Robinson et al., 2011), the majority analyzed changes in the Dow Jones Sustainability Index (DJSI) and predominantly utilized data from US companies. In an effort to address this research gap, the authors explored the price effects associated with composition changes in the first sustainability index in Central and Eastern Europe — the RESPECT Index. The results revealed a strong negative reaction in the stock prices of companies either included in or excluded from the index, and even though this reaction was short-lived, it was statistically significant. This indicates that investors on the Warsaw Stock Exchange, at least in the short term, tend to divest from stocks of companies considered socially responsible, perceiving these index composition changes as a trading opportunity.

3. The Impact of a Companies' Inclusion in an Index on Its Operational Performance

In his comprehensive literature review, Afego (2017) also observed that although academic research on the implications of changes in index composition started as early as the late 1980s, it initially focused mainly on the price effects of stocks added to or removed from the S&P 500. As mentioned before, since early this century, numerous scientific studies have broadened their scope to explore a more diverse range of indices, each defined by distinct selection criteria and membership regulations. Notably, recent investigations have also increasingly scrutinized the impact of changes in index composition on stock characteristics beyond mere price dynamics. For example, Vijh (1994) and Kot et al. (2015) explored the consequences of adding or removing a company from an index on the level of systemic risk. Pruitt & Wei (1989) analyzed how alterations in the composition of the S&P 500 index affect the magnitude of institutional investors' holdings. This issue was further addressed by Rigamonti & Barontini (2000), as well as Biktimirov et al. (2004), who demonstrated that inclusion in an index is associated with increased interest from institutional investors. Moreover, there has been a nascent interest in the impact of index composition changes on a company's operating performance and profitability ratios, although this aspect has not yet attracted much attention in the scholarly literature. Afego specifically mentioned only two studies (Chan et al., 2013; Kot et al., 2015) that addressed this area.

Chan et al. (2013) investigated whether observable changes in profit margin, return on assets, P/BV ratio, and capital expenditures take place over time for companies added to or removed from the S&P 500. They discovered evidence suggesting enhanced profitability and operational performance for added companies in the five years leading up to their listing. However, the levels of the analysed indicators apparently decline in the subsequent five years after companies' inclusion. In the case of the removed companies, the authors observed a decrease in the examined indicators before removal, with a subsequent return to their previous levels. Kot et al. (2015) explored the influence of alterations in the Hang Seng Index composition on the indicators studied by Chan et al. They found no evidence of a significant enhancement in the operational performance of companies added to the HSI, and conversely, a distinct improvement in profitability and operational efficiency was observed among those removed from the index.

Bai et al. (2023) also found that existing literature on stock indexes primarily concentrated on aspects of the capital market. Consequently, the authors decided to explore the effects of changes in the composition of the CSI 500 index on the performance of added companies. They adopted ROA as the dependent variable to assess firm profitability, with ROE serving as an alternative proxy. Utilizing a staggered difference-in-differences (DID) model, they analyzed a sample of Chinese listed companies from 2010 to 2020. The findings indicated that inclusions in the stock index tended to diminish their performance. Furthermore, the coefficients remained significantly negative following the event year, suggesting that additions to the CSI 500 have a long-term negative impact. The authors suggested that the observed effect arises from a deteriorated information environment, and explained that after inclusion in an index, passive investors tend to hold more shares of the said company, which obstructs the process of incorporating information into the stock price. Given that the stock price's informational content is crucial for management decision-making, the company's inclusion in the CSI 500 index is likely to cause a decline in its performance. For this reason, the authors included an additional proxy variable for stock price informativeness in the regression model, following the method proposed by Roll (1988). The results indicated that companies added to the index experienced a significant decrease in price informativeness, suggesting that the information environment may be a factor through which a company's listing affects its performance.

It is also worth mentioning the research by Denis et al. (2003), which did not examine changes in profitability, yet conducted an in-depth analysis of earnings per share (EPS) forecasts both before and after a company's listing in the S&P 500 index. Their study involved a comparison of realized earnings with pre-inclusion forecasts. The findings revealed that companies newly added to the index exhibit significant increases in forecasted EPS values, coupled with a distinct enhancement in realized earnings when contrasted with non-index participants. Even though both index and non-index entities in the studied period experienced earnings lower than initially predicted, the average disparity between forecasted EPS values and actual levels was significantly smaller for recently added index companies.

4. Research Gap and Methodology

The limited number of studies on the impact of index composition changes on the operational performance of companies highlights a significant research gap. This underlines the pressing need for further examination, particularly within the Polish capital market, which remains an under-researched area among emerging markets. In response to this need, this study aimed to evaluate whether inclusion in the WIG20 index influences a company's operational performance.

When assessing the impact of index composition changes on operational efficiency, it is crucial to consider the specific characteristics of the Polish capital market in terms of the construction of stock indices. Most of the previously mentioned studies were conducted based on revisions to the S&P 500 index. The authors often suggested that companies may be selected as index participants due to the high likelihood of improving operational performance or achieving a leading position in their industry

in the near future. However, in the case of the most popular stock indices on the Polish stock market, such as WIG20 and mWIG40, the selection of companies for the index is not influenced by evaluations conducted by the index creators or any external institution, and instead it is determined by meeting specific criteria. The primary criterion for a company's listing concerns the total number of shares in free float, the total value of shares in free float, and the trading frequency. According to the description of the WIG20 index methodology, its "constituents are 20 companies with the highest position in the ranking selected based on data following the trading session on the third Friday of February, May, August, and November. The ranking is based on 12-month turnover values and free float capitalization based on closing prices selected from the last five trading sessions before the ranking day." Whereas constituents of mWIG40 are "40 more (after WIG20) companies with the highest position in the ranking." Therefore, there is no possibility for a company to be included in the index based on the anticipated significant improvement in its financial performance. However, the criteria applied by the GPW do not rule out that increased scrutiny (and also control) from the capital market resulting from a company's inclusion in the WIG20 or mWIG40 may translate into a significant improvement in operational profitability. To investigate whether a similar relation indeed exists among companies added to the Polish stock market indices, the revision of both indices' compositions was analyzed, and the following cases were identified based on that analysis (see Table 1).

Table 1. Overview of entries, exits, and transitions between the WIG20 and mWIG40 indices from 2000 to 2020

Case number	Description
1	Inclusion of a company in WIG20
2	The transition of a company from mWIG40 to WIG20
3	Inclusion of a company in mWIG40
4	The transition of a company from WIG20 to mWIG40
5	Removal of a company from mWIG40
6	Removal of a company from WIG20 without qualifying for mWIG40

Source: own elaboration.

These cases represent changes that occurred for companies participating in the WIG20 and mWIG40 indices. All the observed changes took place during the research period covering the years 2000 to 2020. According to the established criteria, for a change in the index composition to be categorized as one of the notable cases, a specific condition must be fulfilled — the status of the company before and after the change should persist for a minimum of four consecutive quarters. For instance, a particular scenario will be identified as the transition of a company from mWIG40 to WIG20 (case no. 2) if, initially, the company was listed in mWIG40 for at least four quarters, and subsequently, for an equal or longer duration, it became a constituent of WIG20. Introducing the criterion of a minimum timeframe both before and after the observed change allowed for the assignment of a specific number of observations to each case (see Table 2).

Table 2. Number of entries, exits, and transitions between the WIG20 and mWIG40 indices from 2000 to 2020

Case number	Description	Number of observations
1	Inclusion of a company in WIG20	7
2	The transition of a company from mWIG40 to WIG20	17
3	Inclusion of a company in mWIG40	70
4	The transition of a company from WIG20 to mWIG40	22
5	Removal of a company from mWIG40	61
6	Removal of a company from WIG20 without qualifying for mWIG40	no observations

Source: own elaboration.

Table 2 shows the number of cases classified into the previously distinguished categories. This means, for example, that during this period, 17 companies that were originally listed in mWIG40 moved to WIG20, while 70 companies were included in mWIG40 without prior listing in WIG20. The analysis did not consider cases where a company was 'promoted, from sWIG80 to mWIG40, or vice versa. Further study will include the effects of changes occurring in the composition of the sWIG80 index.

An analysis of the index composition changes showed that most companies that were listed in WIG20 had previously been part of the mWIG40 index. Similarly, when a company was removed from WIG20, it was added to mWIG40. The research question addressed in this article aimed to examine whether the operational performance of companies improves following their shift from mWIG40 to the more prestigious WIG20 index.

As mentioned earlier, during the study period, 17 such cases were observed, involving the following companies: Firma Oponiarska Dębica SA, Asseco Poland SA (similar changes occurred twice for Asseco Poland), Kęty SA, Grupa Lotos SA, Polimex-Mostostal SA, Cyfrowy Polsat SA, Lubelski Węgiel Bogdanka SA, Jastrzębska Spółka Węglowa SA, Boryszew SA, Eurocash SA, LPP SA, Energa SA, Enea SA, CCC SA, CD Projekt SA, Dino Polska SA. For each company, the following operational performance indicators were calculated:

- EBIT margin (calculated as the ratio of EBIT operating profit to total revenue),
- Return on Assets (ROA) (EBIT value divided by total asset value),
- EBITDA to total assets,
- Net profit to sales/total revenue.

The first three metrics are derived from EBIT (earnings before interest and taxes), representing profit after deducting all operating expenses. These factors were adopted from studies conducted in the American market by Chan et al. (2013). Kot et al. (2015) later applied the same measures when examining the impact of changes in the Korean Hang Seng index. The last indicator was employed to account for another category of company profit, specifically related to sales. The values of these metrics were calculated for the four quarters preceding and following the index change. Calculations were performed using two methods: based on individual values from each quarter or utilizing moving averages, as illustrated in the formula below (an example of calculating the metric for the fourth quarter of 2003):

$$EBIT\ margin_{Q4-2003} = \frac{average\ EBIT\ for\ period\ Q_1 - Q_4\ in\ 2003}{average\ total\ revenue\ for\ period\ Q_1 - Q_4 in\ 2003}.$$

Next, for each applied indicator, the normal value was determined, calculated as the average of the eight quarters preceding the transition of the company from the mWIG40 index to WIG20. This allowed to examine whether, in any quarter of the four periods preceding the change and the four periods immediately following it, the quarterly indicator significantly deviated from the norm. For this purpose, excess and cumulative excess values of the indicators were calculated. Finally, four variants of each of the analyzed measures were obtained:

- abnormal value calculated based on data from a single quarter (the difference between the indicator value from the current quarter and its normal value) – abnormal_EBIT,
- cumulative abnormal value (the sum of the abnormal value from the current quarter and the accumulated abnormal values of indicator from previous quarters) – cumul_ab_EBIT,
- abnormal value calculated based on the moving averages of the last four quarters – abnormal_mEBIT_on_AVG,
- cumulative abnormal value calculated based on abnormal values derived from moving averages – cumul_ab_mEBIT_on_AVG.

The research hypothesis was formulated as follows: the transition of a company from the mWIG40 index to WIG20 does not lead to an improvement in its operational results. To examine the hypothesis,

the Student's *t*-test was employed to determine whether, in any of the four quarters before and after the index change, the value of excess or cumulative excess indicators was significantly different from zero. Rejecting the research hypothesis for any quarter would imply that operational performance indicators in at least one of the quarters preceding or following the index change significantly differ from the norm.

5. Results

The results obtained using the *t*-Student test are presented in Table 3.

Table 3. The results of *t*-Student test

indicator	t+4	t+3	t+2	T+1	T0	T-1	T-2	T-3	T-4
abnormal_mEBIT	0.020 (0.157) [0.599]	-0.010 (0.197) [0.840]	0.025 (0.123) [0.414]	0.016 (0.132) [0.617]	0.031 (0.153) [0.421]	0.016 (0.110) [0.560]	0.024 (0.039) [0.024]**	0.025 (0.057) [0.090]*	0.012 (0.048) [0.312]
cumul_ab_mEBIT	0.070 (0.550) [0.608]	0.049 (0.406) [0.623]	0.059 (0.258) [0.359]	0.034 (0.143) [0.340]	0.018 (0.040) [0.082]*	-0.013 (0.150) [0.730]	-0.029 (0.247) [0.640]	-0.052 (0.267) [0.431]	-0.077 (0.302) [0.307]
abnormal_mEBIT_on_AVG	0.020 (0.165) [0.630]	0.021 (0.165) [0.605]	0.028 (0.155) [0.466]	0.028 (0.137) [0.416]	0.032 (0.117) [0.273]	0.026 (0.082) [0.217]	-0.010 (0.054) [0.444]	-0.009 (0.043) [0.379]	-0.018 (0.055) [0.189]
cumul_ab_mEBIT_on_AVG	0.105 (0.658) [0.519]	0.086 (0.496) [0.488]	0.064 (0.335) [0.440]	0.036 (0.182) [0.423]	0.009 (0.052) [0.505]	-0.024 (0.080) [0.242]	-0.049 (0.159) [0.221]	-0.039 (0.114) [0.176]	-0.030 (0.076) [0.128]
abnormal_ROA	0.002 (0.036) [0.845]	0.000 (0.037) [0.983]	0.004 (0.024) [0.460]	0.002 (0.027) [0.783]	0.003 (0.033) [0.709]	0.005 (0.024) [0.357]	0.003 (0.011) [0.273]	0.004 (0.017) [0.323]	-0.002 (0.016) [0.588]
cumul_ab_ROA	0.008 (0.122) [0.797]	0.006 (0.095) [0.798]	0.006 (0.063) [0.690]	0.002 (0.042) [0.863]	0.000 (0.022) [0.993]	-0.003 (0.035) [0.720]	-0.009 (0.045) [0.445]	-0.012 (0.047) [0.332]	-0.016 (0.053) [0.238]
abnormal_ROA_on_AVG	0.003 (0.031) [0.703]	0.003 (0.031) [0.694]	0.004 (0.027) [0.579]	0.004 (0.024) [0.533]	0.005 (0.019) [0.326]	0.003 (0.012) [0.267]	-0.002 (0.008) [0.239]	-0.002 (0.006) [0.164]	-0.002 (0.009) [0.345]
cumul_ab_ROA _on AVG	0.017 (0.114) [0.554]	0.014 (0.084) [0.506]	0.011 (0.054) [0.419]	0.007 (0.028) [0.306]	0.003 (0.010) [0.179]	-0.001 (0.019) [0.815]	-0.004 (0.030) [0.544]	-0.002 (0.025) [0.747]	0.000 (0.022) [0.971]
abnormal_EBITDA/ total assets	0.001 (0.035) [0.863]	0.000 (0.037) [0.966]	0.004 (0.024) [0.491]	0.001 (0.028) [0.859]	0.002 (0.033) [0.794]	0.005 (0.024) [0.426]	0.003 (0.012) [0.282]	0.002 (0.018) [0.672]	-0.002 (0.017) [0.591]
cumul_ab_EBITDA/ total assets	0.005 (0.126) [0.883]	0.003 (0.101) [0.902]	0.003 (0.071) [0.878]	-0.001 (0.050) [0.906]	-0.003 (0.030) [0.716]	-0.005 (0.037) [0.605]	-0.009 (0.045) [0.394]	-0.013 (0.046) [0.266]	-0.015 (0.051) [0.258]
abnormal_EBITDA/ assets_on_AVG	0.004 (0.030) [0.572]	0.004 (0.030) [0.639]	0.004 (0.027) [0.565]	0.004 (0.023) [0.471]	0.005 (0.018) [0.285]	0.003 (0.014) [0.366]	-0.002 (0.008) [0.247]	-0.003 (0.007) [0.125]	-0.001 (0.012) [0.649]
cumul_ab_EBITDA/ assets_on_AVG	0.019 (0.109) [0.477]	0.015 (0.080) [0.447]	0.012 (0.050) [0.356]	0.008 (0.026) [0.237]	0.003 (0.017) [0.415]	-0.001 (0.028) [0.860]	-0.004 (0.038) [0.647]	-0.002 (0.039) [0.836]	0.001 (0.035) [0.932]
abnormal_net profit sales/ revenue	0.065 (0.194) [0.188]	0.026 (0.059) [0.094]*	0.023 (0.058) [0.132]	0.024 (0.080) [0.229]	0.064 (0.189) [0.181]	0.007 (0.075) [0.714]	0.008 (0.039) [0.408]	0.002 (0.035) [0.852]	0.008 (0.051) [0.522]
cumul_ab_net profit sales/ revenue	0.193 (0.403) [0.066]*	0.128 (0.232) [0.037]**	0.102 (0.217) [0.070]*	0.080 (0.164) [0.063]*	0.055 (0.101) [0.038]**	-0.009 (0.113) [0.760]	-0.015 (0.155) [0.689]	-0.023 (0.147) [0.522]	-0.025 (0.127) [0.430]
abnormal_net profit sales/ revenue_on_AVG	0.037 (0.087) [0.098]*	0.036 (0.085) [0.098]*	0.031 (0.101) [0.224]	0.029 (0.092) [0.218]	0.025 (0.080) [0.212]	0.010 (0.023) [0.100]	0.002 (0.018) [0.662]	-0.003 (0.024) [0.569]	-0.013 (0.031) [0.097]*
cumul_ab_net profit sales/ revenue_on_AVG	0.111 (0.325) [0.177]	0.074 (0.242) [0.222]	0.038 (0.162) [0.342]	0.007 (0.065) [0.642]	-0.021 (0.039) [0.039]**	-0.046 (0.113) [0.109]	-0.056 (0.132) [0.098]*	-0.058 (0.122) [0.067]*	-0.055 (0.102) [0.042]**

Source: own elaboration.

It is clear from the above table that for the first three indicators (EBIT margin, return on assets, and EBITDA/total assets), there was no evidence to reject the tested hypothesis. This suggests that the transition of the examined companies from mWIG40 to WIG20 did not have a significant impact on their operational performance. However, different conclusions can be drawn when considering the indicator of net income on sales/total revenue. In some quarters and various variants of this indicator, it was observed that the indicators significantly deviated from zero. This is particularly evident in the variant where the net income on sales/total revenue indicator was calculated as the cumulative abnormal value. In this version of the applied measure, significant differences were observed in all the quarters after the change and in the same period when the company transitioned between indices. The t-Student test indicated statistically significant differences also in the periods preceding the change, as can be seen in the case of the last of the four variants of the examined indicator.

6. Conclusions

The analysis of changes in the values of indicators used by Chan et al. (2013) and Kot et al. (2015) did not reveal a significant relation between the transition of the examined companies from mWIG40 to WIG20 and their operational performance. However, a statistically significant difference was noted solely in the net income on sales/total revenue measure. Therefore, a definitive answer to the question of whether increased market interest leads to improved operational efficiency in newly added index companies cannot be provided. Nevertheless, the findings of this study present several implications for business practitioners. The addition of a company to an index does not conclusively lead to improved operational efficiency, indicating that such an event should not be viewed as a definitive signal of future performance enhancement. However, the observation of a statistically significant difference solely in the net income on sales/total revenue measure suggests that becoming an index member might influence only certain specific financial metrics of the company. The lack of a conclusive answer to the research question may result from the reaction time considered in the study being too short. While the promotion of a company to WIG20 may improve its condition, the four quarters following the index revision might not be sufficient to observe statistically significant changes in indicator values. It would undoubtedly be worthwhile to expand this study by including a longer reaction time after a company's inclusion in the index and by employing more advanced statistical tools such as panel regression, which can better handle data variations over time. Additionally, analyzing changes in companies included in the sWIG80 index could provide valuable insights. This index, which includes smaller companies with a lower popularity among investors and reduced liquidity, might show different effects when these companies are added to the index, potentially leading to improved operational results.

References

Afego, P. N. (2017). Effects of Changes in Stock Index Compositions: A Literature Survey. *International Review of Financial Analysis*, (52), 228-239.

Bai, T., Li, Z., Lin, Y., & Liu, H. (2023). Stepping Stone or Stumbling Block? The Effect of Stock Index Inclusions on Firm Performance. *Applied Economics Letters.*

Becker-Blease, J. R., & Paul, D. L. (2006). Stock Liquidity and Investment Opportunities: Evidence from Index Additions. *Financial Management*, *35*(3), 35-51.

Białkowski, J., & Sławik, A. (2021). Do Investors Respond to Changes in the Composition of Sustainability Indices *Bank i Kredyt*, *52*(4), 319-338.

Biktimirov, E. N., Cowan, A. R., & Jordan, B. D. (2004). Do Demand Curves for Small Stocks Slope Down? *Journal of Financial Research,* (27), 161-178.

Biktimirov, E. N., & Li, B. (2014). Asymmetric Stock Price and Liquidity Responses to Changes in the FTSE SmallCap Index. *Review of Quantitative Finance and Accounting, 42*(1), 95-122.

Bildik, R., & Gulay, G. (2008). The Effect of Changes in Index Composition on Stock Prices and Volume: Evidence from the Istanbul Stock Exchange. *International Review of Financial Analysis*, *17*, 178-197.

Cai, J. (2007). What's In the News? Information Content of S&P500 Additions. *Financial Management, 36*, 113-124.

Chan, K., Kot, H. W., & Tang, G. Y. N. (2013). A Comprehensive Long-term Analysis of S&P 500 Index Additions and Deletions. *Journal of Banking & Finance*, *37*(12), 4920-4930.

Chen, H., Noronha, G., & Singal, V. (2004). The Price Response to S&P500 Index Additions and Deletions: Evidence of Asymmetry and a New Explanation. *Journal of Finance, 59*, 1901-1929.

Cheung, A. (2011). Do Stock Investors Value Corporate Sustainability? Evidence from Event Study. *Journal of Business Ethics, 99*, 145-165.

Chung, R., & Kryzanowski, L., (1998). Are the Market Effects Associated with Revisions to the TSE300 Index Robust? *Multinational Finance Journal, 2*, 1-36.

Consolandi, C., Jaiswal-Dale, A., Poggiani, E., & Vercelli, A. (2009). Global Standards and Ethical Stock Indexes: The Case of the Dow Jones Sustainability Stoxx Index, *Journal of Business Ethics, 87*(1), 185-197.

Denis, D. K., & McConnell, J. J., Ovtchinnikov, A. V., & Yu, Y. (2003). S&P500 Index Additions and Earnings Expectations. *Journal of Finance, 58*, 1821-1840.

Fernandes, M., & Mergulhao, J. (2016). Anticipatory Effects in the FTSE 100 Index Revisions. *Journal of Empirical Finance*, *37*, 79-90.

Gok, I. Y., & Goksen, H. (2023). The Response of Trading Volume to Borsa Istanbul Sustainability Index Inclusions and Exclusions. *Research Anthology on Business Law, Policy, and Social Responsibility*, *4-4*, 1838-1854.

Gregoriou, A. (2006). Information Costs and Liquidity Effects from Changes in the FTSE 100. *The European Journal of Finance*, *12*(4), 347-360.

Gygax, A., & Otchere, I. K. (2010). Index Composition Changes and the Cost of Incumbency. *Journal of Banking and Finance*, *34*(10), 2500-2509.

Hanaeda, H., & Sarita, T. (2003). *Price and Volume Effects Associated with a Change in the Nikkei 225 Index List: Evidence from the Tokyo Stock Exchange* (Working Paper No. 68). Graduate School of Commerce and Management, Hitotsubashi University.

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*, 815-829.

Hawn, O., Chatterji, A. K., & Mitchell, W. (2018). Do Investors Actually Value Sustainability? New Evidence from Investor Reactions to the Dow Jones Sustainability Index (DJSI). *Strategic Management Journal, 39*(4), 949-976.

Jain, P. (1987). The Effect on Stock Price of Inclusion in or Exclusion from the S&P 500. *Financial Analyst Journal*, *43*(1), 58-65.

Kot, H. W., Leung, H. K. M., & Tang, G. Y. N. (2015). The Long-term Performance of Index Additions and Deletions: Evidence from Hang Seng Index. *International Review of Financial Analysis*, *42*, 407-420.

Liu, S. (2000). Changes in the Nikkei 500: New Evidence for Downward Sloping Demand Curves for Stocks. *International Review of Finance, 1*(4), 245-267.

Mase, B. (2007). The Impact of Changes in the FTSE 100 Index. *Financial Review, 41*, 461-484.

Merton, R. C. (1987). Presidential Address: A Simple Model of Capital Market Equilibrium within Complete Information. *Journal of Finance, 42*, 483-510.

Pruitt, S. W., & Wei, K. C. J. (1989). Institutional Ownership and Changes in the S&P500. *Journal of Finance, 44*, 509-513.

Rigamonti, S., & Barontini, R. (2000). Stock Index Futures and the Effect on Cash Market in Italy: Evidence from Changes in Indexes' Composition (EFMA 2000 Athens Meeting).

Robinson, R., Kleffer, A., & Bertels, S. (2011). Signaling Sustainability Leadership: Empirical Evidence of the Value of DJSI Membership. *Journal of Business Ethics, 101*, 493-505.

Roll, R. (1988). R2, *Journal of Finance, 43*(3), 541-566.

Shankar, S. G., & Miller, J. M. (2006). Market Reaction to Changes in the S&P Small Cap 600 Index. *Financial Review*, *41*, 339-360.

Shleifer, A. (1986). Do Demand Curves for Stocks Slope Downward? *Journal of Finance, 41*, 579-590.

Vespro, C. (2006). Stock Price and Volume Effects Associated with Compositional Changes in European Stock Indices. *European Financial Management*, *12*, 103-27.

Vijh, A. (1994). S&P 500 Trading Strategies and Stock Betas. *The Review of Financial Studies*, *7*(1), 215-51.

Wang, C., Murgulov, Z., & Haman, J. (2015). Impact of Changes in the CSI 300 Index Constituents. *Emerging Markets Review*, *24*, 13-33.

Wpływ zmian składu indeksu WIG20 i mWIG40 na wyniki operacyjne dodanych spółek

Streszczenie

Cel: Celem artykułu jest zbadanie, czy przejście spółek z indeksu mWIG40 do bardziej prestiżowego indeksu WIG20 wpływa na ich efektywność operacyjną.

Metodologia: Analizie poddano 17 spółek, które w latach 2000–2020 zostały włączone do indeksu WIG20 po opuszczeniu mWIG40. Dla każdej spółki obliczono cztery wskaźniki efektywności operacyjnej w czterech kwartałach poprzedzających i następujących po zmianie składu indeksów. W celu ustalenia, czy zmiana ta miała istotny statystycznie wpływ na wyniki operacyjne, zastosowano test *t*-Studenta.

Wyniki: Analiza nie wykazała istotnych statystycznie zmian w większości badanych wskaźników efektywności operacyjnej po przejściu do indeksu WIG20. Wyjątkiem była marża zysku netto, która w niektórych kwartałach po zmianie indeksu wykazała istotne statystycznie różnice.

Implikacje: Otrzymane wyniki potwierdzają hipotezę, że włączenie spółki do bardziej prestiżowego indeksu, takiego jak WIG20, nie prowadzi do poprawy jej efektywności operacyjnej. Oznacza to, że zmiany w składzie indeksu nie powinny być traktowane jako jednoznaczny sygnał potwierdzający atrakcyjność dodanych spółek.

Oryginalność/wartość: Badanie wnosi wkład do istniejącej literatury, analizując wpływ zmian kompozycji indeksów na wyniki spółek notowanych na GPW w Warszawie i wypełniając tym samym istniejącą lukę badawczą.

Słowa kluczowe: skład indeksów giełdowych, wyniki spółek, efektywność operacyjna