Is MBI10 the suitable index for the Macedonian Stock Exchange - An overview of MSE

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This research paper investigates the suitability of the MBI10 index for the Macedonian Stock Exchange (MSE) by providing a comprehensive analysis of the exchange's structure, stock liquidity, and the performance of the index in comparison to regional and global benchmarks. The paper begins with an introduction to the MSE, detailing the liquidity of the stocks listed, which is critical for understanding market efficiency and investors' confidence. A thorough analysis of the MBI10 index follows, evaluating its construction, historical performance, and volatility in relation to other significant regional and worldwide indices.

Additionally, the research segments the stocks listed on the MSE by sector, proposing new tailored indices that could better reflect the diverse economic activities present within the market. The research pays particular attention to the effects of key events that have impacted stock valuations, including the COVID-19 pandemic, the ongoing Ukraine-Russia war, the introduction of new trading days, and significant mergers and acquisitions (M&A). By examining these elements, we aim to assess the resilience and

adaptability of the MBI10 in capturing market dynamics and investor sentiments in an evolving economic landscape. The study employed various quantitative methods, including beta calculations, regression analysis, seasonality analysis, and market ratios, to evaluate the valuation of stocks and the suitability of the index MBI10. Ultimately, this paper contributes to the ongoing discussion regarding the effectiveness of the MBI10 as a representative index for the MSE, providing valuable insights for investors, policymakers and market analysts.

1. Introduction

The liquidity of capital markets plays a crucial role in the development and growth of post-Soviet and post-socialist economies, as it facilitates efficient allocation of resources, enhances investor confidence, and encourages foreign investment. In transitioning economies, liquid capital markets allow a more dynamic environment where businesses can access financing through equity and debt instruments, which is essential for fostering innovation and competition (Levine, 2005). Studies have shown that greater liquidity contributes to lower cost of capital and improved financial stability, which are vital for sustainable economic growth (Bekaert, Harvy & Lunblad., 2005). Moreover, liquid capital markets aid in the integration of these economies into the global financial system, providing them with exposure to international best practices and investment opportunities (Shleifer & Vishny, 1997). Thus, improving capital market liquidity is integral to the overall economic resurgence of post-Soviet states, supporting their transition towards market-oriented economies (World Bank, 2010).

The development of capital markets in post-Soviet and post-Yugoslavian countries has been marked by significant challenges and transformation since the early 1990s. In the post-Soviet space, countries like Russia and Ukraine have gradually developed their capital markets, though they still face issues such as regulatory weaknesses, political instability, and oligarchic control that hinder market efficiency (Black, 2001; Berglöf & Thorton, 2013). Meanwhile, the Balkan nations arising from the dissolution of Yugoslavia have experienced a more fragmented market development, with varying levels of success; for instance, Slovenia and Croatia have made strides towards integration with European financial systems, while others like Kosovo continue to struggle with establishing a robust financial infrastructure (Pavlovic, 2012; Mihailov and Stjepandić, 2016). Despite these hurdles, recent efforts in both regions to enhance regulatory frameworks and promote foreign investment signal a gradual shift towards more developed and stable capital markets (OECD, 2020).

Macedonian Stock Exchange (from now on refereed as MSE) is the only national stock exchange in North Macedonia. Functioning as a joint-stock company, the MSE operates under the legal framework set by the Law on Securities and plays a crucial role as a financial intermediary in the country (Law on Securities, 2020). Initiated with the support of the British know-how fund and the participation of 19 legal entities, including 13 banks, 3 insurance companies and 3 savings houses, the MSE began its operations with a starting capital of 1 million German marks (MSE, 2013).

The early years of the MSE were characterized by limited trading activity, with sessions held twice weekly through traditional auction methods. The stock exchange gradually evolved, adopting new trading mechanisms such as block transactions in 1998 and moving towards full electronic trading by 2002, thanks to collaborations with international partners (MSE History, 2024).

Despite its potential, the MSE's status as a monopoly, protected by law, has rendered it less attractive as a funding source compared to commercial banks. Stigmas rooted in the

speculative environment of the 2007-2008 stock market bubble have further diminished its appeal, contributing to a perception of instability. Over the years, regulatory changes mandated that all businesses with capital exceeding 1 million EUR comply with mandatory quotation requirements, providing a modest boost in liquidity but did not reach the all-time peaks form the period 2007 – 2008. (Daneva, 2022).

Today, the MSE is primarily owned by the major banks in the country, reflecting its origins as a non-profit initiative that transitioned into a regulated entity. The historical context of the MSE, marked by significant economic transformations, continues to shape its operations and governance, influencing how it functions within the Macedonian financial landscape.

Table.1 Ownership structure represented in the table down below.

Owners with more than 5% equity stake	2023 in %	2021 in %
Zagreb Stock Exchange Zagreb	**29.98%**	7.06%
Sparrkasse Banka AD Skopje	19.52%	19.52%
Komercijalna Banka AD Skopje	9.99%	9.99%
Stopanska Banka AD Skopje	9.92%	9.92%
NLB AD Skopje	6.09%	6.09%
KB Publikum Invest	5.48%	5.48%
Central Cooperative Bank AD Sofia	5.30%	5.30%
UNI Banka AD Skopje	5.30%	5.30%
TTK Banka AD Skopje		9.99%
Eurostandard Bank AD Skopje – bankruptcy		9.89%
Other shareholders with a participation of slightly over 5%	8.42%	**21.35%**

The authors notice the tendency of consolidation in the ownership structure (Table 1). The failure of the Eurostandard Bank and buyouts from the Zagreb Stock Exchange consolidated and concentrated the ownership structure of the stock exchange. This could be a factor that plays a role into the perception regarding the stock exchange and the market as a whole being an inadequate form for capital raising.

The MSE management had done certain reforms to change the current landscape/perception, such as the Boom Club – pilot program for new IPOs and the Investor/Trading Days (Boom Club MSE, 2024). But in the time of writing this paper, the only and main index MBI10 is sidetracking the progress needed. Despite the initiative for new IPOs, regulatory bodies including the Stock Exchange, SEC or Central Securities Depository, except for the mentioned Investor/Trading Day, have not acted upon lowering fees with other incentives. The current Top 5 brokerage firms by total traded volume trading on the MSE, have their fees for buy/sell orders under 10 000EUR as follows (authors calculations based on publicly available data provided by the individual firms/divisions):

- Eurohaus – maximum of 2,95% total transaction fee.

- Ilirika – maximum of 3% total transaction fee.

- KB (Komercijalna) Bank – around 1.5% total transaction fee. (0.75% + expenses for Depositary and other misc.)

- Invest Broker – estimated around 1.8% total transaction fee.

- STB (Stopanska Bank Skopje) – estimate 1.715% total transaction fee (1.015% + 0.2% custody + other regulatory/depositary misc. fees)

The latest list indicates that transaction fees for a retail trader are far from the industry standard ranging from 0% to 0.5% transaction fees for trading at NYSE, NASDAQ and other developed markets using traditional brokerages or online trading platforms such as

Interactive Brokers, Robinhood etc. (Interactive Brokers, Commissions, 2024), which could be perceived as a burden to overall market liquidity and also trading frequency for retail traders and, subsequently, institutional traders.

1.1 Hypotheses and time frame/stamps

The authors set the following main hypotheses and relevant research to support it:

- H0: *MBI10 as a liquidity weighted index is not a suitable index for the MSE being a concentrated, illiquid market.*

Liquidity-weighted indices tend to concentrate investments in a small number of highly liquid stocks. (Chordia, T., & Subrahmanyam, A, 2004) When liquidity-weighted indices adjust, such as when an index re balances or reshapes its methodology, large trades may occur in the index's constituents. If these stocks are heavily favored by the liquidity-weighted methodology, significant buying/selling can lead to price distortions and impact shallow markets negatively. (Shleifer, A., & Vishny, R.W., 1997) When funds tracking liquidity-weighted indices are forced to buy or sell stocks based on index re balancing or turnover, it can lead to abrupt changes in stock prices and volatility. Funds may sell stocks that are not part of the index, even if those stocks are fundamentally sound, leading to increased price pressure on these stocks and harming their liquidity. (Fama, E. F. ,1970).

As liquidity concentrates in specific stocks or sectors due to liquidity-weighting methodologies, it may lead to market fragmentation. Traders looking for liquidity in less popular stocks may find it harder to execute trades without impacting the market price, further exacerbating liquidity issues in those segments (Barber, B. M., & Odean, T. , 2000).

Investor behavior can shift in response to liquidity-weighted indices, where managers might avoid less liquid stocks altogether in favor of those that dominate the indices, creating a self-reinforcing cycle of diminished liquidity *In the absence of market makers, a liquidity weighted*

index is not a suitable index for the MSE being a concentrated, illiquid market for the less desirable stocks (Daniel, K., Hollanders, J., & Kahn, C., 2007).

The additional hypotheses are as follows:

- *H1: In the absence of market makers, a liquidity weighted index is not a suitable index for the MSE being a concentrated, illiquid market.*

In the absence of market makers, the bid-ask spreads for illiquid stocks tend to widen. This means that buyers are required to pay more to purchase stocks (the ask price), while sellers receive less when selling (the bid price). This widening of spreads reduces the attractiveness of trading in these stocks, further decreasing their liquidity (Stoll, 2000). Illiquid stocks are more prone to price volatility. Without market makers to absorb excess supply or demand, any significant buy or sell order can lead to drastic price changes. This volatility can create a disincentive for investors to trade these stocks (Chordia, Roll, & Subrahmanyam, 2000).

- H2: *MBI 10 and its methodology affects the efficiency of the MSE*

Market efficiency, as outlined in the Efficient Market Hypothesis (EMH), suggests that stock prices reflect all available information. In liquid-weighted indices, securities with higher trading volumes or liquidity contribute more significantly to the index's performance. This can affect the price discovery process by amplifying the influence of certain stocks over others (Fama, E. F. 1970). Liquid-weighted indices can create feedback loops where valuation is driven by liquidity concerns rather than fundamental values. Stocks that are part of these indices tend to attract more attention and analyst coverage, which can lead to overvaluation during market upswings and undervaluation in downturns (Benartzi, S., & Thaler, R. H., 1995). Research shows that stocks in liquid-weighted indices may exhibit different volatility patterns than those that are less liquid. Higher liquidity can correlate with lower costs of capital and higher stock valuations, creating a disparity in expected returns for certain groups of investors (Amihud, Y. 2002). The weighting scheme of these indices can lead to 'momentum' effects where securities become over- or under-valued based on their liquidity

rather than intrinsic value. Firms with large market caps may continue to dominate the indices, perpetuating these trends (Jegadeesh, N., & Titman, S., 1993).

- H3: *Seasonality and performance are not significantly affected by Investor Days (Fee free), but rather by stock-specific or macroeconomic events.*

While fee-free days aim to stimulate trading by reducing transaction costs, their impact on overall market behavior is generally limited compared to the overarching forces of economic data and company-specific information. Such promotional events may induce short-term spikes in trading activity but do not alter the intrinsic liquidity characteristics or align with deeper market trends (Madhavan, 2000). Markets can experience significant seasonal effects due to macroeconomic indicators such as GDP reports, employment data and inflation rates. For instance, the market tends to exhibit specific behaviors around quarterly earnings announcements and Federal Reserve meeting dates, influencing trading volumes and price movements. Research indicates that investor sentiment and economic outlook play a critical role in these seasonal trends (Baker & Wurgler, 2006). Seasonal patterns can also be attributed to stock-specific events, such as earnings releases, product launches and regulatory changes that can significantly impact individual stocks, particularly in less liquid markets. The announcement of these events often leads to increased trading volumes and volatility, which may not be captured adequately during fee-free days (Bhattacharya & Nanda, 2000). Illiquid markets inherently experience higher sensitivity to structural changes and external shocks. Seasonal trading patterns can emerge from routines in institutional trading and investor behavior linked to fiscal year-end or tax strategies. For example, year-end re balancing by funds can create seasonal upward or downward pressure on stock prices (Amihud, 2002).

1.2 Time frame/stamps

The selected timestamps included in the research are in the interval: 2018Q3 till 31.07.2024 at the end of the quarters (which either falls on 31.03, 30.06, 30.09, 31.12, respectfully, or the previous trading day before one of the mentioned dates). Other significant dates which do not fall under the quarter timestamps are:

Global Events:

- COVID crisis (5th of March 2020)

- Ukraine-Russia Conflict (23-25th February 2022)

- Gaza – Israel Conflict (09th September 2023) *Some sources may refer it as Hamas instead of Gaza

- The Yen Carry Trade Crisis (05th August 2024)

  MSE specific events:

- Investor Days (TRD) – happening every 18th September except for the first official year 13th September;[1]

- KMB publicly declares interest in an acquisition of SBT (26th September 2023);

- OILK – subsidiary of MPT offers a buyout offer over its founding company MPT (22th February 2024);

- OKTA – publicly stated the intention of doing an intensive buyout by the owner. (23th April 2024);

- REPL – effectively does an 1:10 stock split of its stock. (17th July 2024).

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[1]   1 2019, 2018 have been added for seasonality analysis.

2. Market Conditions and History

Having briefly introduced MSE and MBI10 in the introduction and in section 1.1, in the following section we have done an quantitative overview into MSE. With analysis of Trading Volume, Liquidity of stocks and presented the detailed methodology of MBI10 with some hypothetical calculations for barriers of entry for less liquid stock issuers.

2.1   Traded Volume, Liquid Stocks, Stocks with Price Movements

Presented in Table 2 the overall Liquidity of the Market is on the decline, calculated as the total Traded Volume (not excluding Bonds and other securities) over the Total Market Capitalization of the Equity. Which has been on the decline, especially after the new Tax Reforms which enforce previously excluded Capital Gains Tax from Securities and Income from Dividends for Individuals. (Shteriev, 2023)

Table 2.   **Total Market Capitalization, Total Traded Volume, Liquidity in %**

In mm EUR	2023	2022	2021	2020	2019	2018
Market Cap	3761.86	3484.15	3640.44	2978.06	3014.98	2636.89
Traded Volume (Including Bonds & Block transactions)	75.08	121.04	209.00	133.25	113.83	169.33
Liqudity in %	1.99%	3.47%	5.74%	4.47%	3.77%	6.42%

Source: Yearly Trading Official Reports from MSE 2023-2018

Not only the overall Liquidity is on the decline, but also the number of "Liquid" stocks (meaning stocks with some valuation/price changes) presented in Table 3.

Table 3.   Number of Total Quoted Stocks, "Liquid" Stocks,   Liquidity in %

Stocks	2024	2023	2022	2021	2020	2019	2018
Total Quoted	86	86	86	86	86	86	86
Price Changed Stocks " Liquid "	36	43	45	46	48	42	34
Liqudity in %	41.86%	50.00%	52.33%	53.49%	55.81%	48.84%	39.53%

Source: Daily Trading Reports from MSE 2024-2018 (from the dates defined in 2.1)

Because of the decrease in liquidity, the authors hand-picked only 28 relevant out of the 86 stocks which were being traded every year in the researched period. Exceptions were done on the basis of factors like traded % of free-float, buy side demand, affiliated entities, good dividend/management policy, etc.

Stocks that were exempt from the general liquidity rule were:

- MPOL – being a hotel subsidiary of MPT (part of MBI10)

- BIM – having a great dividend policy and demand for the stock.

- EVRO, MKSD – being subsidiaries of FERS.

2.2   MBI 10 index, history, structure, methodology

The MSE introduced the Macedonian Stock Exchange Index (MBI) on November 1, 2001. This index was composed of the five most liquid stocks listed on the exchange: Alkaloid AD Skopje, Evropa AD Skopje, Komercijalna Banka AD Skopje, Makpetrol AD Skopje, and Toplifikacija AD Skopje. As the first stock market index in the Republic of North Macedonia, MBI served as an aggregate indicator to quantify stock market movements and performance. (Dimitrova, 2015)

Upon its introduction, it was acknowledged that the MSE needed a weighted index to better reflect market conditions. This resulted in the launch of the MBI10 on January 4, 2005, which uses market capitalization for weighting, providing a more accurate representation of price movements on the Macedonian Stock Exchange. The MBI10 includes the common shares of 10 listed companies: *Alkaloid AD Skopje*, Toplifikacija AD Skopje, *Komercijalna Banka AD Skopje*, *Makpetrol AD Skopje*, Fersped AD Skopje, *Stopanska Banka AD Bitola, Granit AD Skopje, Makedonijaturist AD Skopje*, Evropa AD Skopje, and Ohridska Banka AD Ohrid. (*current elements of MBI10 are in italics*.)

The base value for MBI10, set at 1,000, is the index value as of December 30, 2004. Instead of using the traditional quarterly revision basis, it is revised on a semiannual basis. Overall the index has a complex set of factors which cause some miss valuations using the free-float adjusted market capitalization.

Examples could be found in KMB, ALK and TTK.

Formula for calculation of the Index

$$MBI10_t = \frac{\sum_{i=1}^{n} p_{i,t} * q_{i,R} * FF_i}{\sum_{i=1}^{n} p_{i,0} * q_{i,R} * FF_i} * 1000 * C_t$$

- i = 1...n;

- n - number of revisions;

- t - day of trading;

- R – day of revision of the index

- T - moment before the beginning of the next revision period on index i after day t;

- Pi , t - current average price of the shares included in index i on day t;

- Pi 0 - base price;

- qi - quantity of a certain share;

- FFi - free float factor of issuer i;

- j - day of regular or extraordinary revision.

- Ct – corrective factor – streaming effect against sudden drops in weights

Weighing of the factors is done in the following manner:

- 50% is weighted based on the Free float adjusted Market Capitalization. (non free float is only ownership by one entity over 5% of the total issue of the Equity)

- 30% is weighted based on the Volume traded.

- 20% is weighted based on the active days of the stock.

Alteration to these calculation is done by the rule set, not to concentrate one stock above the others with the stop at maximum weight per element of 20%.

As noticed penetration by non-elements into the Index, in Layman terms is Mission Impossible. Because of the advantage towards stocks with *higher* free floats and the correction factor.

In authors calculations, in order a non-element to hypothetically substitute one of the lower market cap elements (such as TTK, MTUR) there is the need of annual expense of 0.5% - 3% of total market expense in not so *legal* activities such as fictitious trading which has it's risk and is highly discouraged by the authors. With limited upside such as higher "liquidity" and investor attention and limited use of company stock as collateral for debt financing. NBRSM (Central bank of North Macedonia) specifies financial collateral with equity instruments, which are part of *MBI10*, the bank applies risk weight of *50%*. In comparison to *100%* for *other equity instruments*. (Central Bank of North Macedonia, 2010). In practice debt with equity instruments is absent, therefore a limited use case for this potential benefit.

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An overview of the elements and structure of the index, as well time series of the weights in the reviewed period, presented in Table 4. Half of the elements in the Index are the commercial banks which have a majority ownership in MSE. In 2023 - Revision 1, SBT (Stopanska Banka AD Bitola) was substituted with UNI (Universal Investment Bank AD Skopje – Subsidiary of First Investment Bank AD Sofia), the inflection point colored in yellow. Noticeable is how the entry weight of UNI is effected by the corrective factor, but overall the entry affected the market cap of UNI positively.

Table 4.   Publicly available weights of MBI10 for the period reviewed

Ticker	24 R2	24 R1	23 R2	23 R1	22 R2	22 R1	21 R2
KMB	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
TEL	5.07%	5.70%	5.95%	5.55%	5.23%	4.73%	5.02%
NLB	13.22%	12.05%	11.28%	10.18%	9.75%	10.76%	9.35%
ALK	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
STB(P)	4.42%	4.54%	4.39%	4.92%	4.47%	4.23%	4.12%
MPT	18.49%	18.30%	18.97%	19.86%	19.35%	19.34%	19.40%
GRNT	8.30%	8.79%	9.33%	10.48%	10.47%	10.54%	11.28%
UNI/SBT	3.03%	2.93%	2.81%	1.90%	3.43%	3.66%	3.66%
MTUR	4.84%	4.70%	4.45%	4.48%	4.42%	4.37%	4.36%
TTK	2.64%	3.00%	2.83%	2.80%	2.26%	2.37%	2.81%

Source: web.archive.org – previews of https://www.mse.mk/mk/content/13/3/2010/structure-of-index-mbi10 **Note:** After asking directly for the missing weights from 2021 R1 – 2018 R2, the authors received an answer that the historic weights were not publicly published and recorded and they are not able to retrieve them because the calculation is being outsourced and transparency is MSE's priority.

3. Is MBI10 the suitable index for the MSE?

For context, the MSE in the previous 6 years reviewed (2023-2018) had almost the same volume as the peak single day volume of NVIDA which was 875 million USD at 19th April 2024. (Finance Charts, 2024) The third largest company by market capitalization, at it's hottest trading day had traded an equivalent volume of 95% of the volume in the six year of MSE. Peer comparison can be seen in Table 5.

Table 5.   Peer comparison of Balkan Stock Exchanges

Traded in mmln EUR	2018	2019	2020	2021	2022	2023	Total
Macedonian (MSE)	169.33	125.20	133.25	208.99	121.04	75.95	833.76
Bulgarian (BSE)	282.05	170.76	205.12	412.82	512.82	410.25	1993.82
Croatian (ZSE)	380.53	399.2	417.06	338.53	392.74	371.78	2299.84

Sources: Trading summaries or Financial Reports of Stock Exchanges with fixed rates for currencies for ease of calculation. Respectfully 61.5MKD, 1.95 BGN, 7.5 HKR for the period used other currencies except EUR.

For the purpose of testing the H0, the authors calculated the Betas of the Stocks and vise versa. (tables 6 & 7) with which have concluded that the major movers of the Index are KMB, NLB, MPT, ALK, UNI. In comparison the other half of the index was identified as lacking averaging the market down regarding performance/risk.

Table 6.   Beta calculation – MBI dependency of individual stocks

MBI dependency of stock	5y BETA	COVID BETA	3y BETA	UKR BETA	1y BETA	GAZA BETA	Chronological AVERAGE
KMB	3.92	4.25	4.60	4.51	4.36	4.25	3.63
TEL	0.03	0.03	0.02	0.02	0.01	0.00	0.01
NLB	6.35	6.76	6.72	6.65	6.12	5.73	5.38
ALK	2.92	2.44	1.90	1.86	1.69	1.62	1.69
STB(P)	0.14	0.17	0.17	0.16	0.19	0.20	0.14
MPT	5.15	4.15	4.94	5.95	7.13	8.34	4.82
GRNT	0.13	0.11	0.08	0.09	0.14	0.15	0.09
UNI (23Q1 – NOW)	1.13	1.29	1.36	1.26	0.78	0.54	0.92
SBT (18Q3 – 22Q4)	0.12	0.10	0.13	0.17	0.26	0.27	0.14
MTUR	0.47	0.79	1.12	1.17	1.23	1.38	0.87
TTK	0.08	0.10	0.13	0.14	0.17	0.17	0.11

Source: Authors calculations. **Note:** Higher the number grater the risk of the Stock in comparison to the Index and vise versa. *Chronological Average is modified*.

Table 7.   Beta calcualtion – Stock dependency on the index performance

Stock dependcy of MBI	5y BETA	COVID BETA	3y BETA	UKR BETA	1y BETA	GAZA BETA	Chronological AVERAGE
KMB	0.24	0.23	0.20	0.21	0.21	0.21	0.18
TEL	27.00	25.11	19.67	19.88	38.72	30.34	22.01
NLB	0.15	0.14	0.14	0.13	0.13	0.13	0.11
ALK	0.32	0.38	0.46	0.45	0.51	0.48	0.37
STB(P)	6.09	5.37	5.63	5.79	5.56	5.33	4.68
MPT	0.11	0.11	0.08	0.11	0.13	0.09	0.09
GRNT	5.91	5.65	3.36	2.52	6.63	5.57	3.98
UNI (23Q1 – NOW)	0.65	0.56	0.38	0.34	0.66	0.60	0.43
SBT (18Q3 – 22Q4)	2.43	1.67	0.82	0.98	2.38	1.94	1.34
MTUR	0.89	0.93	0.84	0.78	0.98	0.84	0.73
TTK	5.89	5.59	5.02	6.26	5.73	5.16	4.69

Source : Authors calculations. **Note:** Inverse from the previous table, lower the number, lower the dependency and grater the risk and, vise versa. *Chronological Average is modified from the standard definition by the use of (n) as a denominator instead of (n-1), which give a more averaged value.*

The same notion can be noticed the discrepancy between the *slackers* and the *performer* stocks by the analysis of the times beating the growth rate of the index and median growth rate comparisons. (Table 8 and 9) Which could confirm our H0 that MSE is not a reflecting the market and it's performance but selected established stocks, furthermore in the next chapter.

Table 8.　　　Growth rate analysis – between stocks and the index

Since beating MBI10	5y in %	COVID in %	UKR in %	GAZA in %	Chronological 5y
KMB	60.98%	73.53%	65.22%	70.00%	51.06%
TEL	26.83%	32.35%	30.43%	10.00%	20.30%
NLB	53.66%	64.71%	52.17%	40.00%	40.93%
ALK	46.34%	55.88%	39.13%	30.00%	33.30%
STB(P)	46.34%	55.88%	47.83%	60.00%	39.22%
MPT	43.90%	52.94%	39.13%	50.00%	34.76%
GRNT	51.22%	61.76%	43.48%	50.00%	38.96%
UNI / SBT	36.59%	44.12%	39.13%	40.00%	30.39%
MTUR	36.59%	44.12%	47.83%	60.00%	35.06%
TTK	34.15%	41.18%	26.09%	20.00%	23.58%

Source : Authors calculations.

Table 9.　　　Growth rate analysis – between stocks and the median

beating the MEDIAN	5y in %	COVID in %	UKR in %	AVERAGE 5y
KMB	100.00%	100.00%	100.00%	100.00%
TEL	33.33%	25.00%	0.00%	33.33%
NLB	66.67%	75.00%	100.00%	66.67%
ALK	50.00%	25.00%	0.00%	50.00%
STB(P)	50.00%	75.00%	50.00%	50.00%
MPT	16.67%	0.00%	0.00%	16.67%
GRNT	66.67%	50.00%	50.00%	66.67%
UNI / SBT	33.33%	50.00%	50.00%	33.33%
MTUR	33.33%	50.00%	100.00%	33.33%
TTK	50.00%	50.00%	50.00%	50.00%

Source : Authors calculations

### 3.1　Market Index, Sector Indexing and Comparison to MBI10

To solve the issue pointed out by H0, the authors formed more simple indices which are weighted only by their market capitalization and could show the true nature of the performance of the overall market, individual sectors and the non-MBI10 segment of MSE.

The structures are as follows, including Name – Ticker – Explanation:

• Market Index (Macedonian Index) – MI – All of the 28 stocks included in the research

• 60th Percentile Index – 60th – The first notion was to use 80th percentile of market cap stocks but making an index with only 6 stocks would not level out the effects from MBI10 and makes less sense in performance measurement for a market such as MSE.

• Market Index without MBI10 – MI wo. MBI10 - Is a makeshift index which excludes the MBI10 elements, which resembles to the Russell 2000 in the NYSE, targeting small caps.

• MBI10 (cap) – elements of the MBI10 index but only considering market cap for weights instead of the current complex methodology.

• Sector Indices (including only liquid stocks with primary activity in the particular sector):

• Finance – formed by all commercial banks: KMB, STB, NLB, SBT, UNI, TTK and the insurance company KJUBI.

• Heavy Industry: USJE – concrete factory, OKTA – oil refinery, GRNT – construction company specialized in highways and bridges, STIL – steel factory, ADIN – construction additives factory, RADE – electro motor factory, BIM – road insulation material factory and (as an exception) TETE (founder of TTK) - textile industry.

• Light Industry: ALK – pharmaceutical company, REPL – pharmaceutical company, TKVS – winery, PPIV – brewery and soft drink factory, EVRO – chocolate/sweets factory, VITA – snacks and sweets factory, ZPKO – wheat producer.

• Services: TEL – Telecom provider, MPT – gas station chain, MTUR – chain of hotels, FERS – logistics company, MPOL – hotel chain (owned by MPT), MKSD – logistics company (majority ownership by FERS).

Comparison regarding performance presented in Graph 1. and Table 10.

Graph 1.   Index Comparison – MBI10 and author synthesized
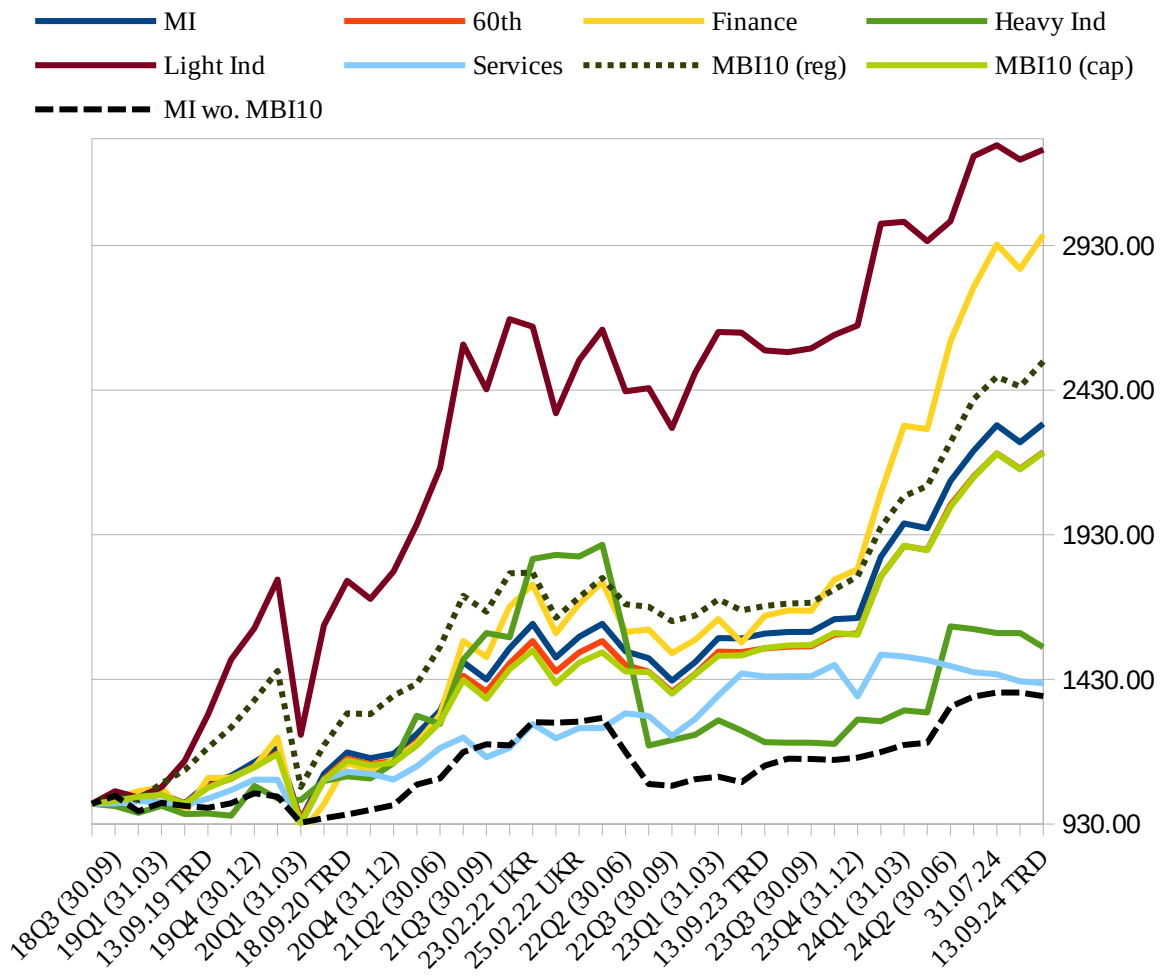
Source : Authors calculations

Table 10.   Comparison of Growth Rates and comparison to the Median

Points	MAX	MIN	Median QTRLY GRWT	Better than MEDIAN GRWT
Light Ind	**3277.24**	1021.77	**5.59%**	TRUE
Finance	**2967.16**	893.59	**4.93%**	TRUE
MBI10 (reg)	**2529.49**	1013.07	**4.90%**	TRUE
MI	**2314.06**	944.66	**4.50%**	TRUE
60th	**2216.24**	942.31	**4.46%**	FALSE
MBI10 (cap)	**2214.43**	932.76	**3.96%**	FALSE
Heavy Ind	**1895.53**	958.50	**1.51%**	FALSE
Services	**1515.32**	929.29	**1.85%**	FALSE
MI wo. MBI10	**1384.33**	933.96	**1.70%**	FALSE
MBI10 vs MI w. MBI10	**1157.51**	4.00	**- N / A -**	
MBI10 difference	**331.40**	-11.14	**- N / A -**	

Source : Authors calculations.

According to the results, it could be concluded that the Market Index has higher than the median growth rate, which somewhat proves the H2, considering that MBI10 (cap) and 60th have lower growth rates than the median. Meanwhile, MI wo. MBI10 with the lower percentiles of median quarterly growth rates implies a market index concentration tendency and inefficiency of the index on reflecting the market trends, as well as the market itself being inefficient.

Major growth accelerators/decelerators in each index have been noticed as follows:

- Service Sector Index – has been decelerated by TEL and MTUR being heavily weighted in the whole index.

- Light Industry Sector – has been accelerated by ALK, REPL which had great growth since the start of the reviewed period.

- MBI (reg) had decelerated its growth by the following stocks: TEL, TTK, STB, GRNT, MTUR/SBT.

The beta analysis of the risk profiles of the indices in comparison of MBI10(reg) and vice versa is presented in the tables below (Table 11 and 12).

Table 11.   Dependencies of the synthesized indexes on the MBI10 (reg)

INDEX dependency on MBI 10 (reg)	5y BETA	COVID BETA	3y BETA	UKR BETA	1y BETA	ISR/GAZA BETA	Chronological AVERAGE
Finance	0.70	0.64	0.60	0.61	0.62	0.64	0.52
Light Ind	0.57	0.67	0.86	0.95	1.13	1.15	0.74
Heavy Ind	1.01	0.74	0.36	0.33	1.87	1.60	0.77
MI	1.04	0.99	0.99	1.04	1.11	1.12	0.87
MBI10 (cap)	1.12	1.06	1.03	1.08	1.18	1.20	0.92
60th	1.13	1.07	1.05	1.11	1.18	1.19	0.93
Services	1.94	1.75	1.50	1.61	0.93	-1.24	1.02
MI wo. MBI10	2.77	2.44	2.35	2.24	2.85	2.74	2.11

Source : Authors calculations. **Note:** Lower the number more independent, higher the number less independent and less risky.

Table 12.   MBI10 (reg) depending on the growth of the synthesized indexes

MBI 10 (reg) dependency on	5y BETA	COVID BETA	3y BETA	UKR BETA	1y BETA	ISR/GAZA BETA	Chronological AVERAGE
Finance	1.37	1.55	1.66	1.63	1.61	1.57	1.32
Light Ind	1.62	1.35	1.05	0.96	0.84	0.79	0.90
MI	0.94	0.99	0.99	0.95	0.90	0.89	0.79
MBI10 (cap)	0.87	0.93	0.94	0.90	0.84	0.83	0.74
60th	0.87	0.92	0.92	0.89	0.84	0.83	0.74
Heavy Ind	0.47	0.38	0.21	0.21	0.46	0.52	0.29
Services	0.38	0.34	0.23	0.15	0.02	-0.03	0.15
MI wo. MBI10	0.29	0.32	0.28	0.28	0.33	0.34	0.26

Source : Authors calculations. **Note:** Inversely from the previous table, higher the number more independent/risky and vice versa.

As noticed, the main movers (sectors with higher growth rates/volatility) of MBI10 (reg) are Finance and Light Industry in different segments of the time frame. In contrast, the rest of the market (MI wo. MBI10) is highly dependent on the movements of the market and therefore, once again, proves the H0 and H2. This is amplified by the fact that there aren't active market makers (at least by definition) on the market, which further down shows the effects emphasized by H1, H2. But some institutional movement has been made, despite pension funds having the limit of investing up to 20% of the assets in equities from the country (Law of Mandatory Market Based Pension Funds, 2021). The movement has been noticed by KB Publikum (majority owned by KMB) which introduced the only MBI10 index-based investment fund, which starting from 2023 has been improving performance due to the new tax reforms according to which individuals are taxed on capital gains on regular equity investments but exempt on fund investing. The size of MBI10 Index Fund managed by KB Publikum is presented in Table 13.

Table 13.   **Equity assets under management and % of the total market cap of MBI10**

In mm EUR	2023	2022	2021	2020	2019	2018
Stocks in MBI 10 KBpublikum	13.34	12.92	13.04	9.40	9.57	3.98
% of total Market Cap of MBI10 (cap)	0.5%	0.54%	0.52%	0.49%	0.5%	0.25%

Source: Audited Yearly Financial Reports of MBI10 fond by KBPublikum and Author Calculations for the % (row 2)

The correlation between the beta of MBI10 (cap) and the share of MBI10 KB fund out of total market cap of MBI10 is -0.7436 which is not as significant as required to prove that with the growth of the MBI10 fund there is a movement towards less risk and concentration of MBI10(cap), especially, taking into consideration that the fund has insignificant ownership of the whole market cap of MBI10(cap) - roughly 0.5%.

These notions, together with the analysis of the ownership structures of the stocks included in the research, have led to a conclusion that market makers are non-existent, which confirms our H1 and suggests the overview in the next section.

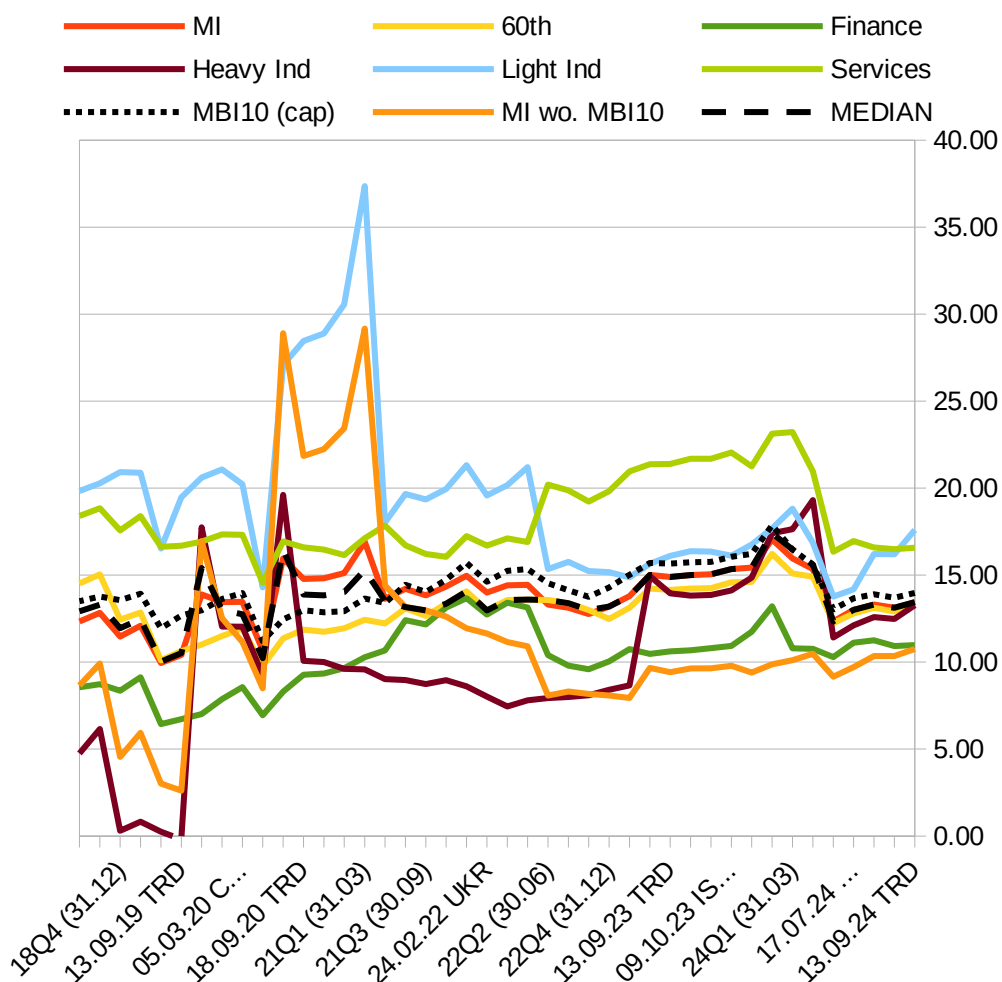### 3.2   *Comparing market ratios among the indices*

In order to overview the overall efficiency which has been a subject in the H1 and H2, we will briefly access market valuations trough the following market ratios, according to CFA Institute, 2021:

- P/S – Price to Sales Ratio is a valuation ratio calculated by dividing a company's market capitalization by its total sales or revenue over the past year. This ratio reflects how much investors are willing to pay per dollar of sales. A lower P/S ratio may indicate that a stock is undervalued relative to its peers.

- P/E – Price to Earnings – Price-to-Earnings Ratio is a financial metric that expresses a company's current share price relative to its earnings per share (EPS). It is commonly used to evaluate an investment's valuation, with a higher P/E suggestive of higher growth expectations, while a lower P/E may indicate undervaluation.

- P/B – Price to Book Ratio compares a company's market value to its book value, which is the net asset value of a company calculated as total assets minus total liabilities. A P/B ratio under 1 might suggest that a stock is undervalued, while a high P/B can indicate that investors expect strong future growth.

- EV/EBITDA – Enterprise Value to EBITDA ratio is a valuation measure that compares the total value of a company (enterprise value) to its earnings before interest, taxes, depreciation, and amortization (EBITDA). It provides insight into a company's operational performance and helps assess its valuation against peers. A lower EV/EBITDA might indicate an undervalued firm.

In this section, authors have calculated the market ratios for each stock included, weighted them by the individual indices and made a comparison. An exemption of the MBI10(reg) was done because of the lack of information during the period from 2018 revision 2 until 2021 revision 1, regarding the individual weights of the elements of MBI10.

Accounting data was taken from the annual audited reports of the individual companies and therefore the 1-year time-lag occurs, despite the market actually using unaudited information to value the analyzed companies. In line with this dataset, we can conclude that the overall market is willing to pay around 3 – 3.5 times the revenue of the companies listed on MSE (Graph 3). The peak is around 2021 because of the time lag effect with the data from 2020 (COVID). It could be noticed that the market is expecting that the financial sector will continue with the current rate of sales / revenue that it had for the fiscal 2023 and 2024 and will hold them in the future.
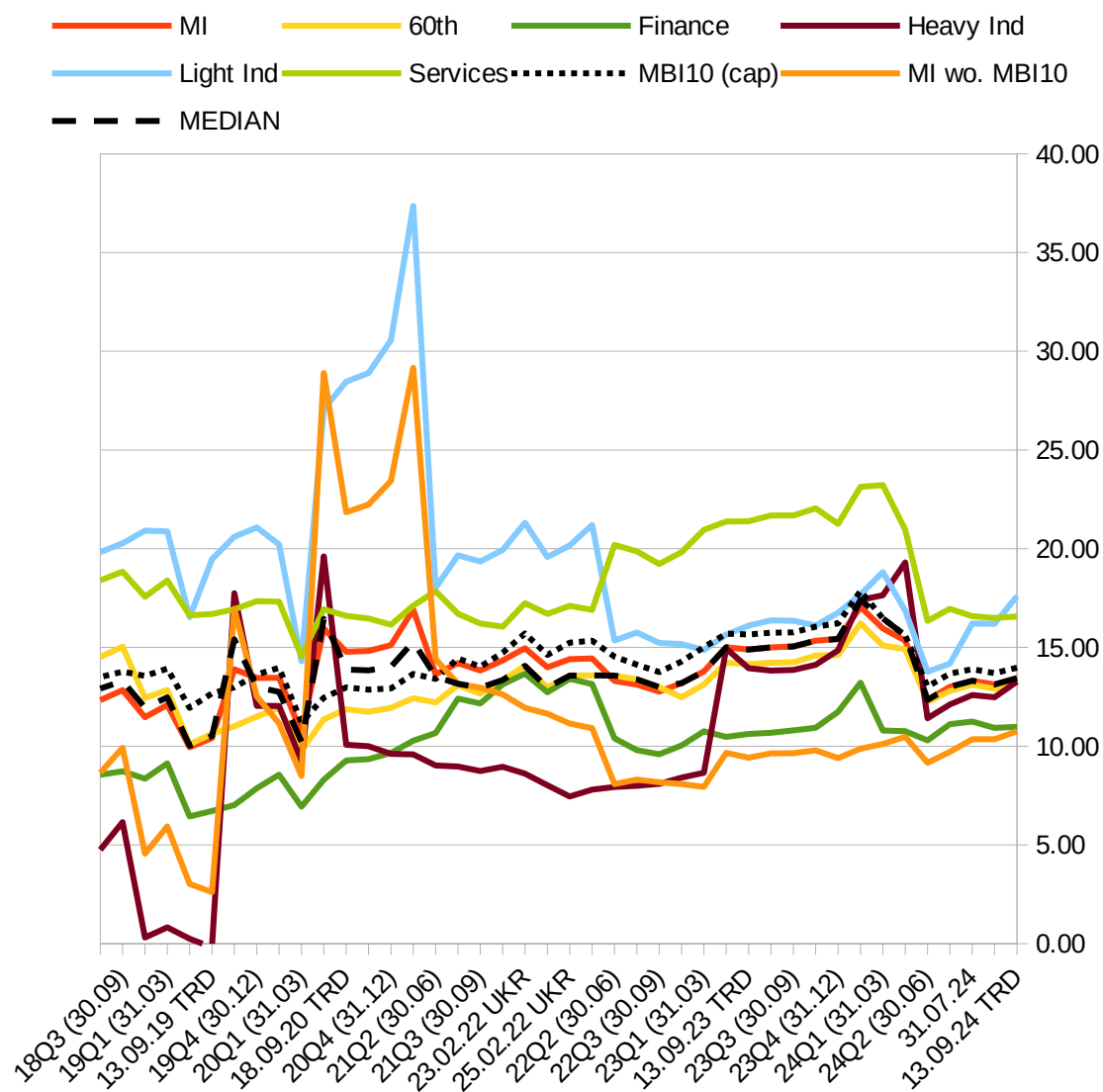
Graph 2.   Price / Sale (P/S)

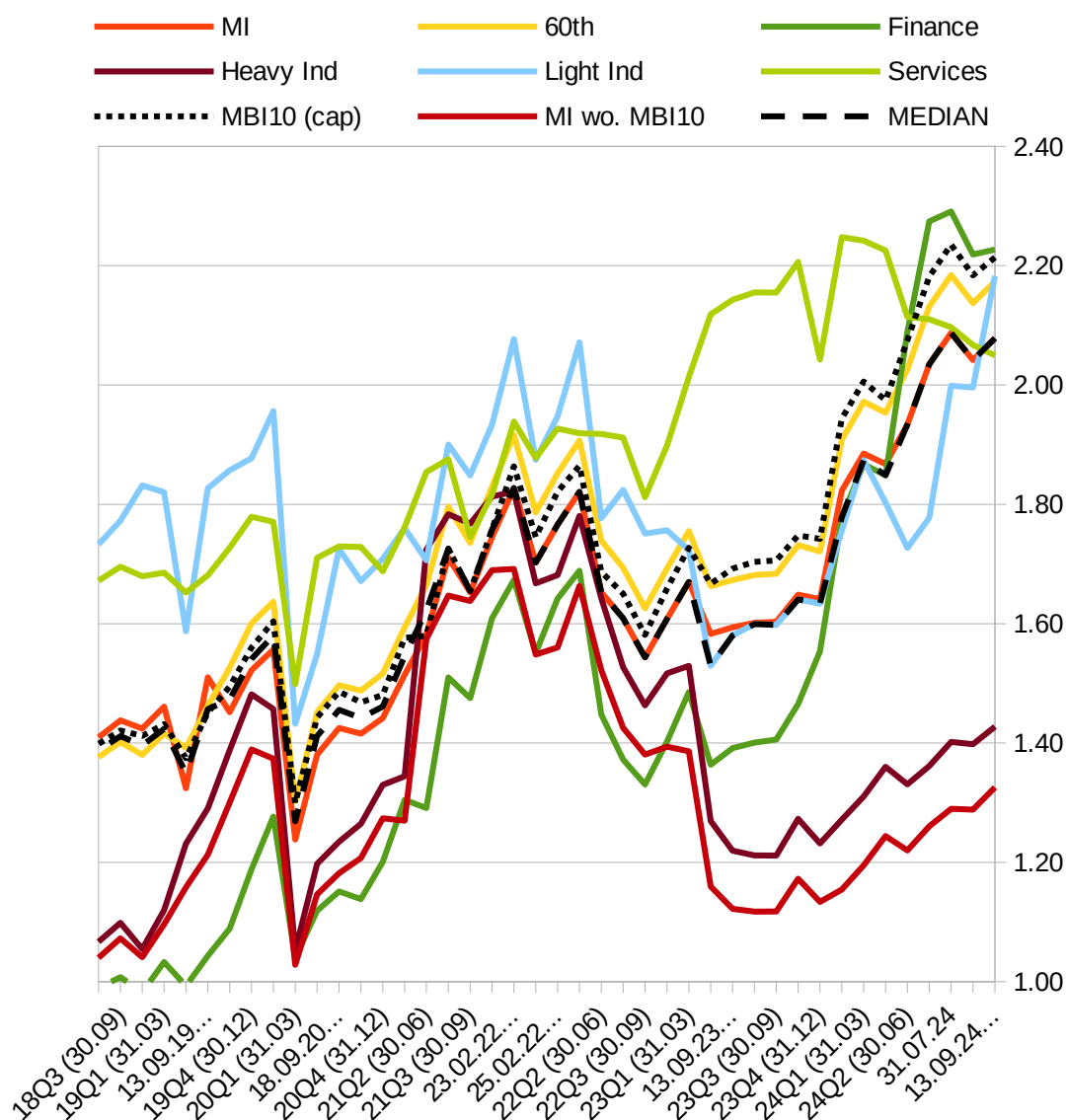**Source:** Author calculations.

Graph 3.   Price / Earnings (P/E)

Legend: MI, 60th, Finance, Heavy Ind, Light Ind, Services, MBI10 (cap), MI wo. MBI10, MEDIAN

Source: Author calculations.

The big peaks have followed the big expectations to gain good earnings by pharmaceutical companies during the COVID crisis, which afterwards go back to near baseline levels Graph 3). The same volatility has been noticed in MI wo. MBI and Heavy Industry because USJE, OKTA and REPL add up to more than 65% of weight of the MI wo. MBI index. When factoring the performance of the Services Index with the P/E data we can conclude that it has been overvalued by the market.

Graph 4   Price / Book Value (P/B)

Legend: MI, 60th, Finance, Heavy Ind, Light Ind, Services, MBI10 (cap), MI wo. MBI10, MEDIAN
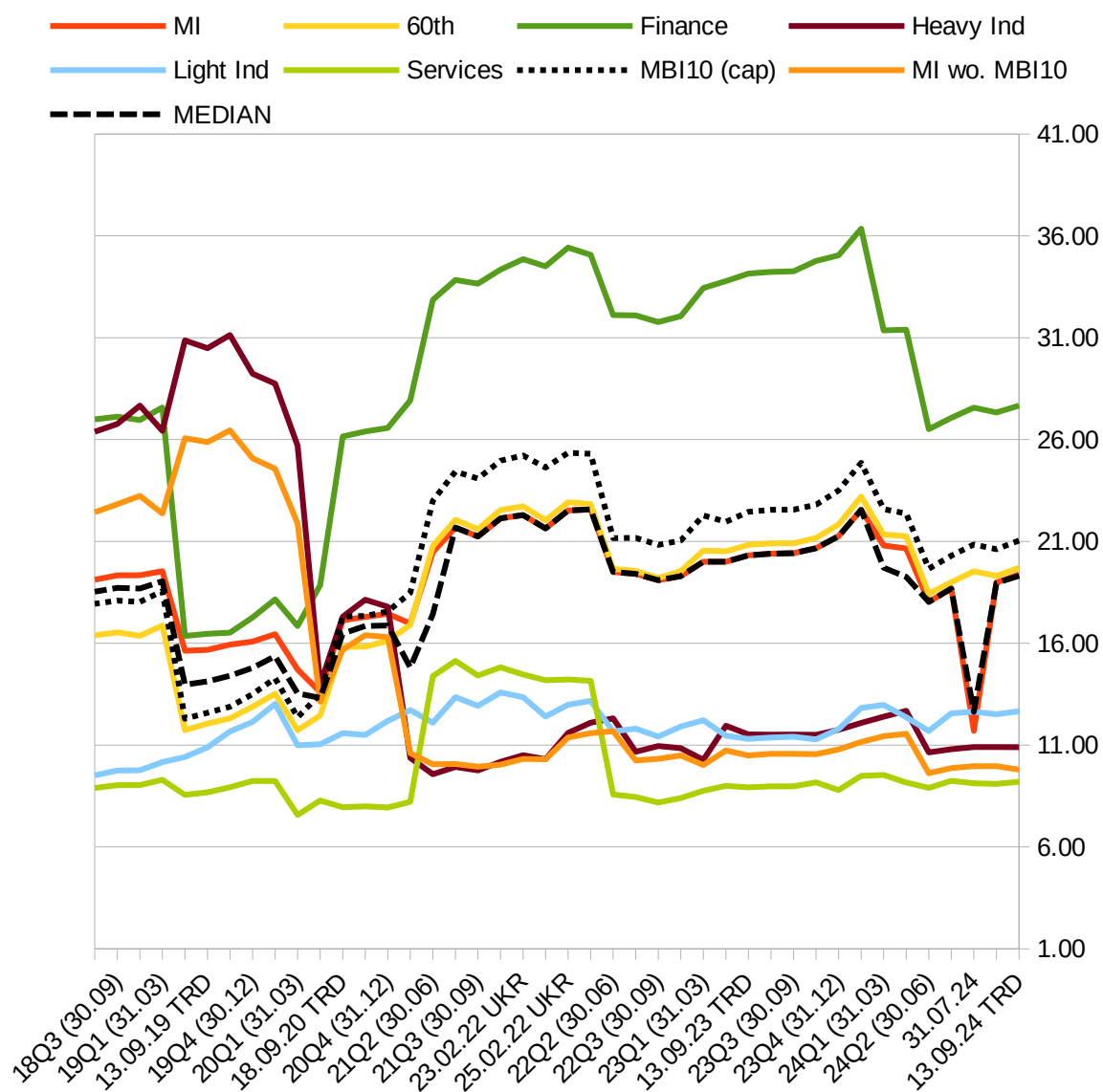
Source: Author calculations.

Focusing only at the Finance sector we could be misguided to conclude that it has been undervalued by the market, if we do not include the highly leveraged nature (which is better reflected by EV/EBIDA). The rise in P/B ratio since 24Q2 within MI and Light Ind. has been a result from the great performance and speculation about REPL's future after the stock split.

The components which are not part of MBI 10, especially MI wo. MBI10 seem undervalued not only by the P/E but according to all the other market ratios previously mentioned, which

26

cause an overall lower efficiency in the market regarding stocks with lower liquidity. Thus, H1 and H2 are proven. This effect is amplified with the EV/EBIDA ratio (Graph 5).

Graph 5.   **Enterprise Value / EBITDA**

Source: Author calculations.

Regarding the Financial sector authors have concluded that markets expectations show that the operating income (EBITDA) would payout the whole capital employed in about 25 – 30 years. This, in comparison to the referent values from various sources, has confirmed that it is overvalued and, subsequently, the whole MBI10 index.

Table 14.   EV/EBIDA value comparison with Bank sector – relevant standards

Referent value for Banks - Source	Finance sector (24Q2)	Institute for M&A imma-institute.org (23 Oct.)	www.equidam .com	Fullratio .com	Bank of America 23Q4	Wells Fargo 23Q4	JP Morgan 23Q4
EV/EBIDA	26.51	13.60	17.98	16.07	8.66	7.48	-173.242

Source: Authors calculations. (Finance sector data – column 2).

Source: Bank of America, Wells Fargo and JP Morgan were sourced from macroaxis.com

4. How does MBI10 compare to the regional and world wide Indexes?

Performance wise the overview has been presented in the graph below.

Graph 6.   Performance of relevant worldwide indexes
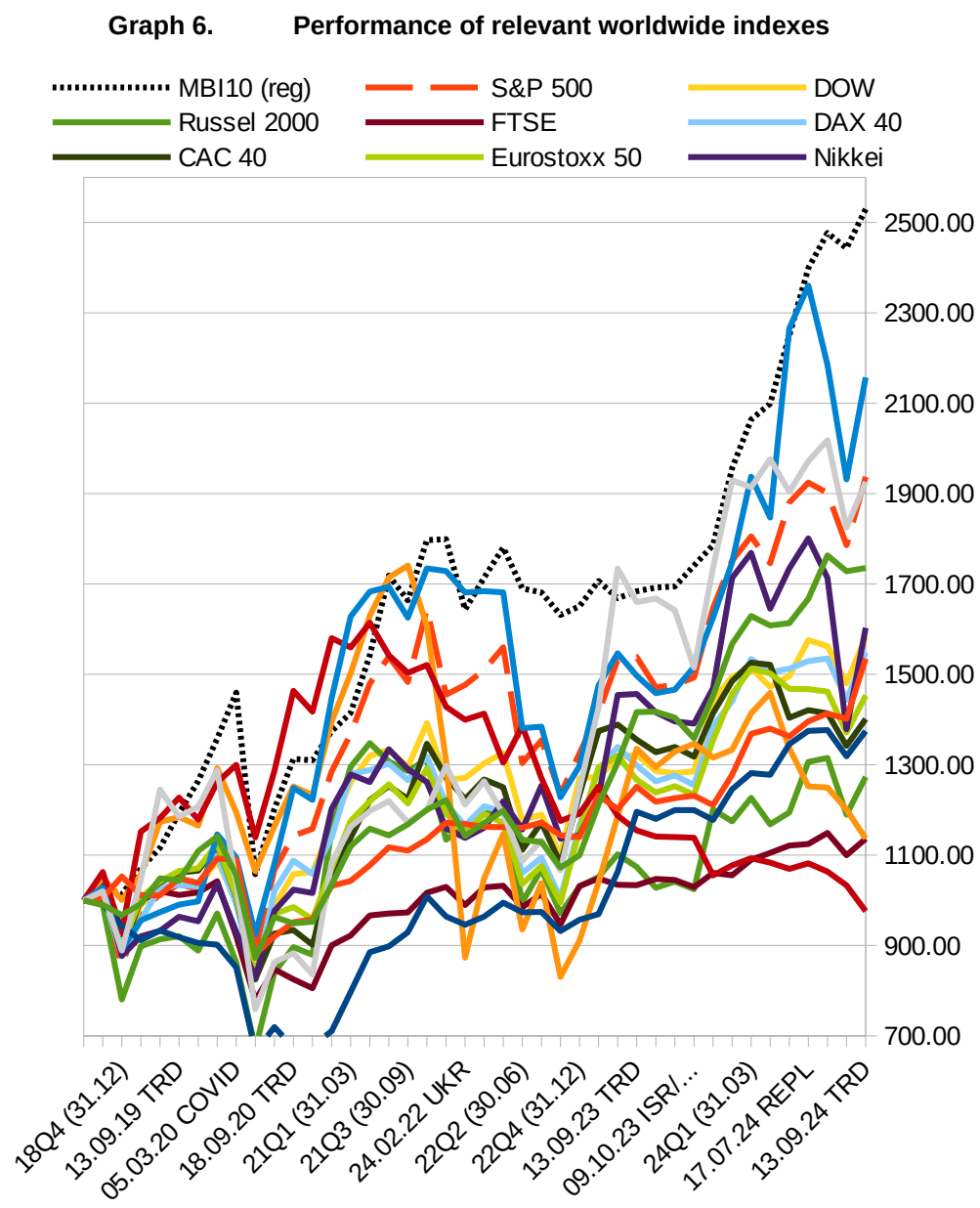
Source: Author calculations.

Base/Start value for the indexing is 1000 points. All indices have been reindexed for the purpose of accurate comparison.

In comparison to other relevant worldwide indices, MBI10 had an excellent run in the reviewed period outperforming the industry standard S&P 500 and almost every other index in the timestamps reviewed. As of time of writing, MBI10 has been ranked as one of the Top 15 ETFs worldwide, with a performance of around 40% YTD (Just ETFs, 2024).

The authors have picked some relevant questions which every investor and curious person would like to know about the index:

- Is this growth sustainable?

- How the decrease of interest rates on borrowing is going to affect the financial industry?

- Is the financial industry going to keep up or improve its current net interest margins?

The questions have been tailored around the financial industry for two main reasons. Firstly, the weight of the sector, according to the last revision, is 43% of the index and, secondly, the beta analysis has led us to the conclusion that this sector has been accredited for the performance of the index, at least in the last 3 years.

Analyzing the dependency on other relevant indices, we can notice that the risk/growth of MBI10 could be attributed as anti-fragile. The only relevant indices that could be pointed out with similar volatility are Nikkei and TWSE50, also having great performance based on the semiconductor stocks performance. In contrast, CSI300 & MOEX on the other side of the world of geopolitics have negative values and had performed poorly in comparison to every other "competitor" in the eyes of the investor.

Table 15.   Beta calculation between the relevant indexed and MBI10's performance

MBI10 (reg) compared to	5y BETA	COVID BETA	3y BETA	UKR BETA	1y BETA	ISR/GAZA BETA	Chronological AVERAGE
S&P 500	1.26	1.25	1.36	1.30	1.65	1.83	1.19
DOW	1.92	1.80	2.04	1.95	2.52	2.67	1.77
Russel 2000	1.74	1.39	0.96	2.42	2.88	2.59	1.63
FTSE	3.38	3.44	4.64	5.37	7.60	6.81	4.36
DAX 40	1.89	1.68	1.57	1.53	2.54	2.36	1.57
CAC 40	1.82	1.55	1.60	1.43	1.50	-0.41	1.13
Eurostoxx 50	1.99	1.71	1.60	1.50	2.40	1.66	1.51
Nikkei	1.32	1.16	1.01	0.95	1.14	0.57	0.87
MOEKS	0.45	0.10	-0.02	0.62	-0.37	-1.97	-0.07
CSI 300	-0.45	-1.12	-1.07	-1.51	-3.86	-4.49	-1.67
TWSE 50	0.98	0.95	0.89	0.88	0.95	0.88	0.77
SOFIX	1.62	1.46	1.45	1.56	2.41	3.77	1.60
BELEX	2.57	2.26	2.37	2.61	3.11	2.75	2.17
ATHEX	0.92	0.79	0.70	0.69	1.43	1.29	0.79
CROBEX	1.49	1.29	1.18	1.17	1.80	2.13	1.21

Source: Authors calculations. **Note:** Closer to 1, the most similar the volatility direction and frequency and vise versa.

4.1 World wide events and market sync (correlation)

As it could be noticed from the tables below, they all summarize the interconnection accredited for transfer of effects to the performance of MBI10 (reg), MBI10 (cap), Finance sector and MI wo. MBI10 (Tables 16 – 19 correlations, regular R).

Table. 16   Correlation analysis between MBI10(reg) and the relevant indices

Global Event Correlations with MBI10 (reg)	Yen Trade	Israel Gaza	Ukraine Russia	COVID	MEDIAN	Overall	Region Median
S&P 500	0.91	0.90	-0.44	0.85	0.88	0.95	
DOW	0.90	0.87	-0.14	0.82	0.85	0.93	0.93
Russel 2000	0.55	0.82	-0.58	0.82	0.68	0.72	
FTSE	0.62	0.49	0.85	0.75	0.68	0.71	
DAX 40	0.86	0.78	0.89	0.80	0.83	0.90	0.86
CAC 40	0.69	0.74	0.89	0.80	0.77	0.84	
Eurostoxx 50	0.74	0.78	0.85	0.79	0.79	0.88	
Nikkei	0.56	0.83	0.81	0.71	0.76	0.87	
MOEKS	-0.67	-0.43	1.00	0.77	0.17	0.23	0.55
CSI 300	-0.73	-0.87	1.00	1.00	0.13	-0.20	
TWSE 50	0.73	0.98	0.92	0.89	0.90	0.93	
SOFIX	0.78	-0.86	0.85	0.90	0.81	0.80	
BELEX	0.95	-0.70	0.34	0.97	0.65	0.94	0.88
ATHEX	0.41	0.42	0.99	0.74	0.58	0.84	
CROBEX	0.07	0.51	0.99	0.84	0.68	0.91	
MEDIAN	0.69	0.74	0.85	0.82	0.76	0.87	

Source: Author Calculations. **Note:** Extreme values 1 and -1 mean perfect inline and inverse correlations respectfully.

Table. 17   Corelation analysis between MBI10(cap) and the relevant indexes.

Global Event Correlations with MBI10 (cap)	Yen Trade	Israel Gaza	Ukraine Russia	COVID	MEDIAN	Overall	Region Median
S&P 500	0.98	0.45	-0.25	0.88	0.67	0.94	
DOW	0.99	0.39	0.06	0.86	0.62	0.92	0.93
Russel 2000	0.93	0.29	-0.40	0.85	0.57	0.67	
FTSE	0.95	-0.15	0.94	0.79	0.86	0.75	
DAX 40	1.00	0.22	0.96	0.83	0.90	0.90	0.87
CAC 40	0.98	0.17	0.96	0.84	0.90	0.85	
Eurostoxx 50	0.99	0.23	0.94	0.83	0.88	0.89	
Nikkei	0.93	0.32	0.91	0.75	0.83	0.89	
MOEKS	-0.13	0.22	0.97	0.81	0.52	0.18	0.54
CSI 300	-0.22	-0.38	0.98	1.00	0.38	-0.33	
TWSE 50	0.99	0.64	0.82	0.92	0.87	0.91	
SOFIX	1.00	-0.37	0.94	0.93	0.93	0.87	
BELEX	0.61	-0.12	0.15	0.98	0.38	0.96	0.92
ATHEX	0.85	-0.23	1.00	0.78	0.82	0.88	
CROBEX	0.62	-0.13	0.95	0.88	0.75	0.95	
MEDIAN	0.95	0.22	0.94	0.85	0.82	0.89	

Source: Author Calculations. **Note:** Extreme values 1 and -1 mean perfect inline and inverse correlations respectfully.

Table. 18   Corelation analysis between Finance and the relevant indexes.

Global Event Correlations with Finance	Yen Trade	Israel Gaza	Ukraine Russia	COVID	MEDIAN	Overall	Region Median
S&P 500	1.00	0.75	-0.28	0.82	0.79	0.92	
DOW	1.00	0.71	0.03	0.79	0.75	0.90	0.90
Russel 2000	0.82	0.63	-0.43	0.78	0.71	0.65	
FTSE	0.86	0.24	0.93	0.71	0.79	0.75	
DAX 40	0.99	0.58	0.95	0.76	0.86	0.88	0.84
CAC 40	0.91	0.53	0.95	0.76	0.83	0.81	
Eurostoxx 50	0.94	0.58	0.93	0.76	0.84	0.87	
Nikkei	0.82	0.65	0.90	0.67	0.75	0.86	
MOEKS	-0.35	-0.17	0.97	0.74	0.28	0.15	0.51
CSI 300	-0.43	-0.71	0.99	1.00	0.28	-0.36	
TWSE 50	0.93	0.88	0.84	0.86	0.87	0.90	
SOFIX	0.95	-0.70	0.92	0.87	0.90	0.87	
BELEX	0.77	-0.48	0.18	0.95	0.47	0.95	0.90
ATHEX	0.72	0.16	1.00	0.70	0.71	0.86	
CROBEX	0.43	0.26	0.96	0.81	0.62	0.94	
MEDIAN	0.86	0.53	0.93	0.78	0.75	0.87	

Source: Author Calculations. **Note:** Extreme values 1 and -1 mean perfect inline and inverse correlations respectfully.

Table. 19   Corelation analysis between MI wo. MBI10 and the relevant indexes

Global Event Correlations with MI wo. MBI	Yen Trade	Israel Gaza	Ukraine Russia	COVID	MEDIAN	Overall	Region Median
S&P 500	-0.68	0.86	0.61	0.98	0.74	0.88	
DOW	-0.66	0.90	0.83	0.97	0.86	0.86	0.86
Russel 2000	-0.19	0.94	0.48	0.97	0.71	0.75	
FTSE	-0.26	1.00	0.84	0.93	0.89	0.73	
DAX 40	-0.60	0.96	0.80	0.96	0.88	0.79	
CAC 40	-0.35	0.97	0.80	0.96	0.88	0.77	0.78
Eurostoxx 50	-0.42	0.96	0.85	0.95	0.90	0.78	
Nikkei	-0.19	0.93	0.88	0.91	0.89	0.74	
MOEKS	0.90	-0.99	0.38	0.94	0.64	0.18	0.46
CSI 300	0.94	-0.90	0.45	0.94	0.70	-0.14	
TWSE 50	-0.41	0.73	0.04	0.99	0.39	0.90	
SOFIX	-0.47	-0.90	0.85	1.00	0.19	0.76	
BELEX	-1.00	-0.98	-0.70	1.00	-0.84	0.85	0.78
ATHEX	-0.02	0.99	0.58	0.93	0.76	0.72	
CROBEX	0.32	1.00	0.34	0.98	0.66	0.81	
MEDIAN	-0.35	0.93	0.61	0.96	0.74	0.77	

Source: Author Calculations. **Note:** Extreme values 1 and -1 mean perfect inline and inverse correlations respectfully.

The overall summary of results in Tables 16-19 is presented as following - MBI10(reg) is most correlated with the US markets and less with Mainland China and Russian indices, except for the in-sync moment regarding the start of the Israel - Gaza conflict.

MBI10(cap) (only capitalization weighted version of MBI10) has overall the best median correlation with each analyzed index in comparison to all other synthesized indices, the only exemption is the Israel – Gaza conflict.

MI wo. MBI10 reacted inversely regarding the Yen Trade and it could be contributed to the illiquidity of the stocks which are not part of MBI10. This could point out the H2 hypothesis, that MBI10 is causing hesitations among investors to invest in less liquid stocks and execute trades which are not significantly correlated to important events, and this could induce a reduced efficiency of the overall market as a result of the concentration which is induced by the methodology of MBI10(reg).

5. Seasonality analysis

With our H3, we have touched apron the seasonality and the ethology of change in it. In this chapter with the use of graphs it has been presented the seasonality of all the MSE indexes, Western Markets, Asian Markets and the Balkan Markets in comparison to MBI10(reg) and MI wo. MBI.
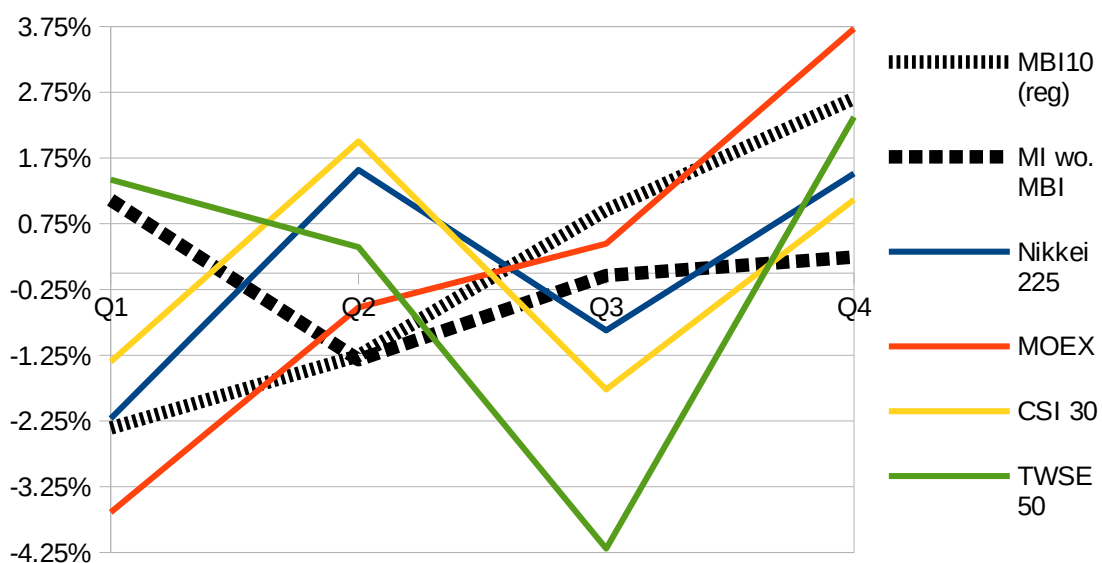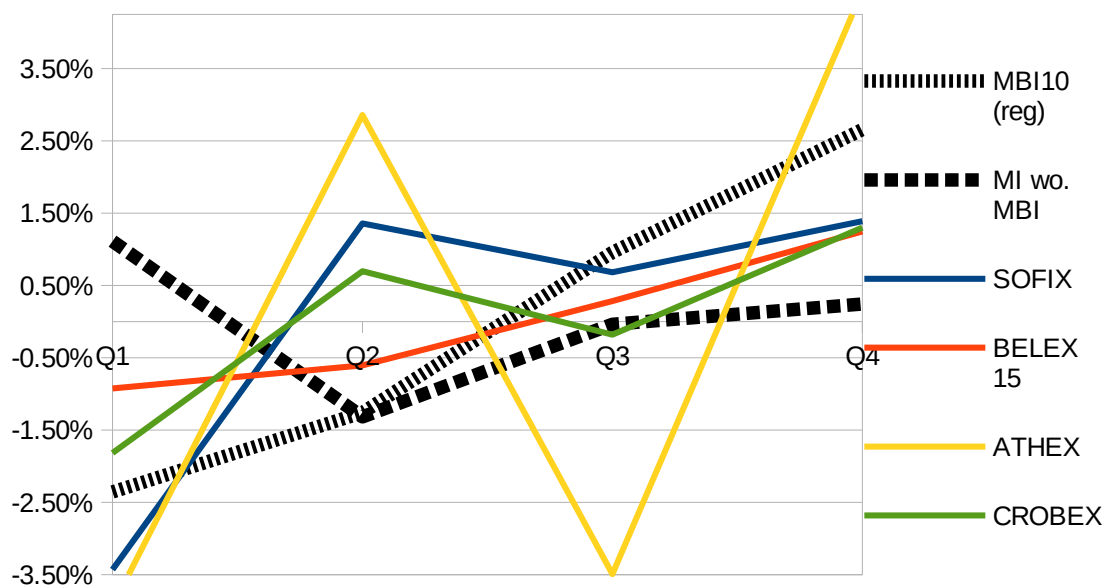
Graph 7.   MSE indexes seasonality analysis

Source: Authors calculations
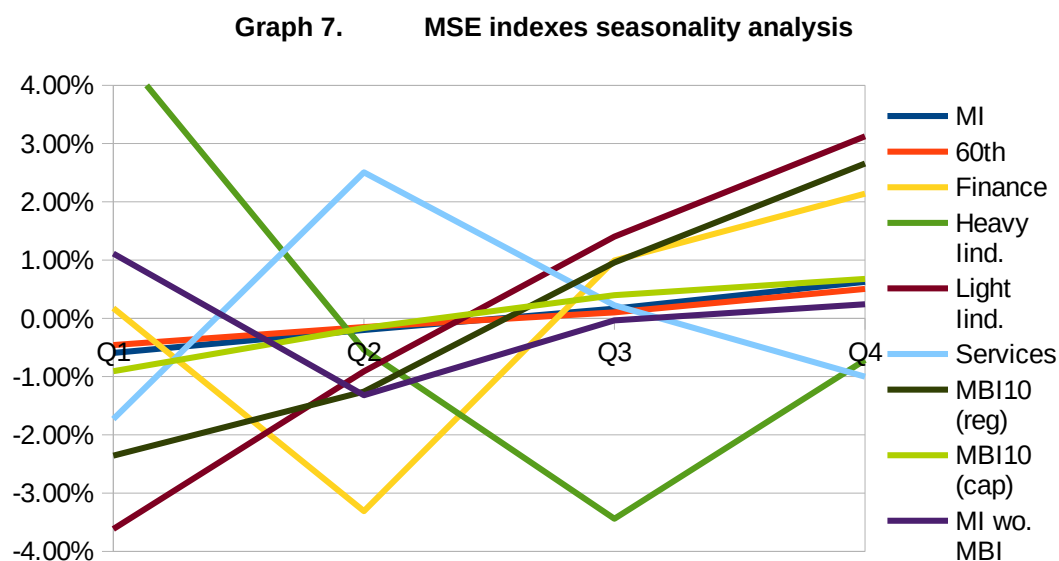
Graph 8.   Western Markets seasonality analysis
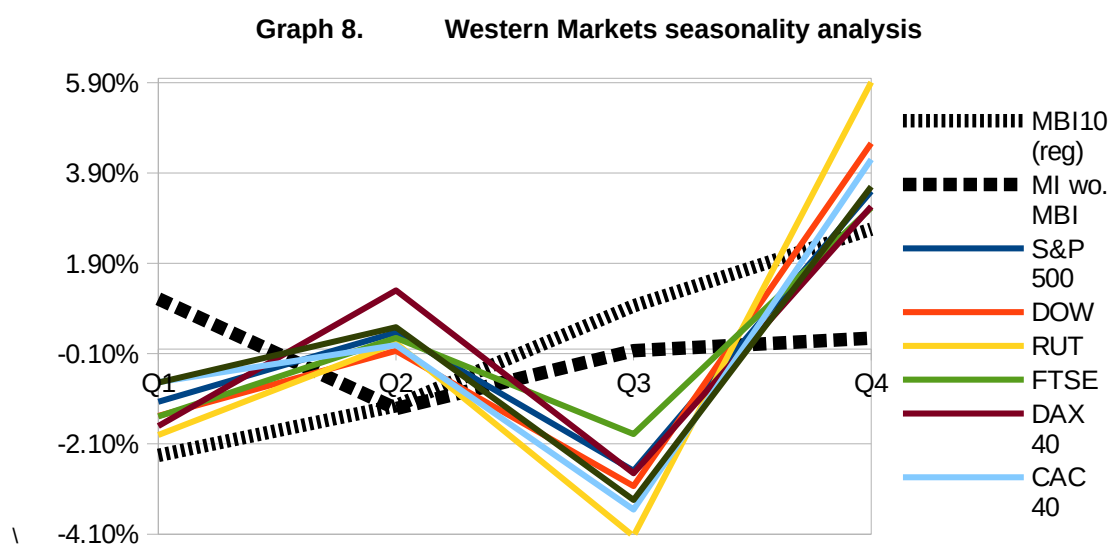
Source: Authors calculations

Graph 9. Asian Markets seasonality analysis

Source: Authors calculations.

Graph 10. Balkan Markets seasonality analysis

Source: Authors calculations.

Graph 7 - the seasonality analysis of MSE point out that Services and Heavy Ind. have inverse seasonality. In absence of consensus line, Finance sector excluding Services and Heavy Ind. are standing out from the concuss line formed around the other indices.

The comparison of Western markets (Graph 8) emphasizes a strong consensus line around seasonality and how tightly they match each other's seasonality. This could be attributed to the volume of institutional investments and higher market efficiency as factors that influence the seasonality of the economies in the Western world.

Regarding the Asian markets (Graph 9) it could be noticed how US influenced markets such as Japan and China (despite having an unofficial trade war with US) follow the same pattern with the Western markets. In contrast MOEX and TWSE 50 (despite being US influenced) have their unique patterns of seasonality.

Lastly, Balkan markets seasonality analysis (Graph 10) clearly shows the disintegration of the individual economies in the Balkans or the miss match of seasonality patterns which could be a result of the lower efficiency in the stock markets and lack of correlation with factors causing economic changes. The only noticeable insignificant correlation could be noticed between SOFIX and CROBEX in their seasonality patterns.

6. MSE Specific Events

In order to test H3, the authors have calculated the effects of the so-called Investor Days which were introduced on 18th September 2020 and have been annually occurring every 13th September. During this day, investors are encouraged to trade, exempt of fees for individuals for transactions up to EUR 10 000 per person (MSE. Investor Day. Sep 13, 2024).

Other handpicked events that occurred in the reviewed period were:

- Replek Stock Split

- OKTA Minority Shareholders Takeover

- MPT acquisition offer from its own related supplier entity OILK

- KMB announces that it will look into acquiring SBT

6.1 Investment/Trading Days

The calculations regarding Investor Days are presented in Graph 11 and Graph 12, according to which authors have concluded that despite the bigger than usual volume achieved during these days of trading without fees, seasonality, in general, is not affected, except for the Light Industry (5%-6%). This conclusion is especially influenced and based on the nonexistent change in the seasonality of MI wo. MBI10. Investors who invest in stocks other than MBI10 elements are not motivated to trade by the average 1.5% discount on transactions costs.

Graph 11   Seasonality of each Index Before and After Trading/Investor days (TRD)
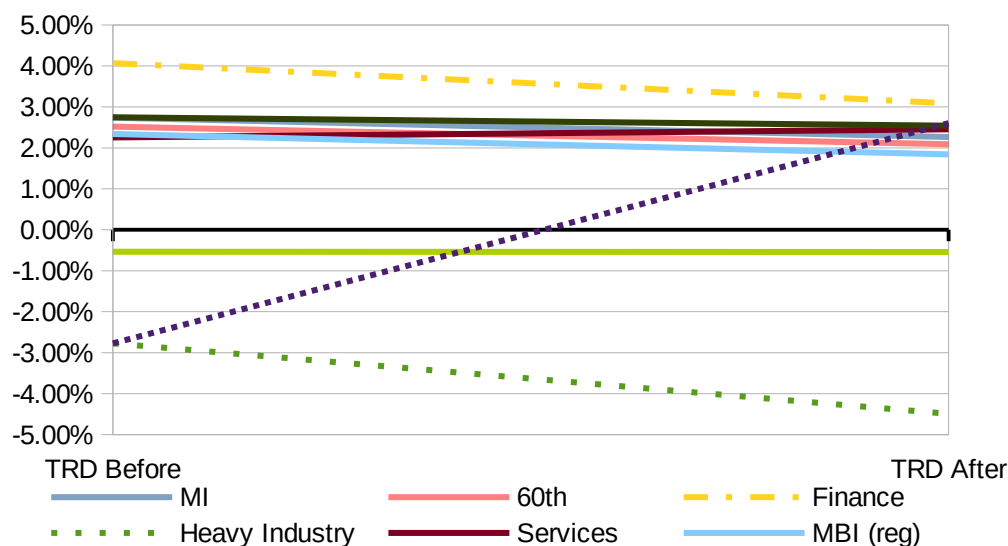
Source: Authors calculations.

Graph 12   Effects/Difference on each Index's Seasonality after the introduction of TRD
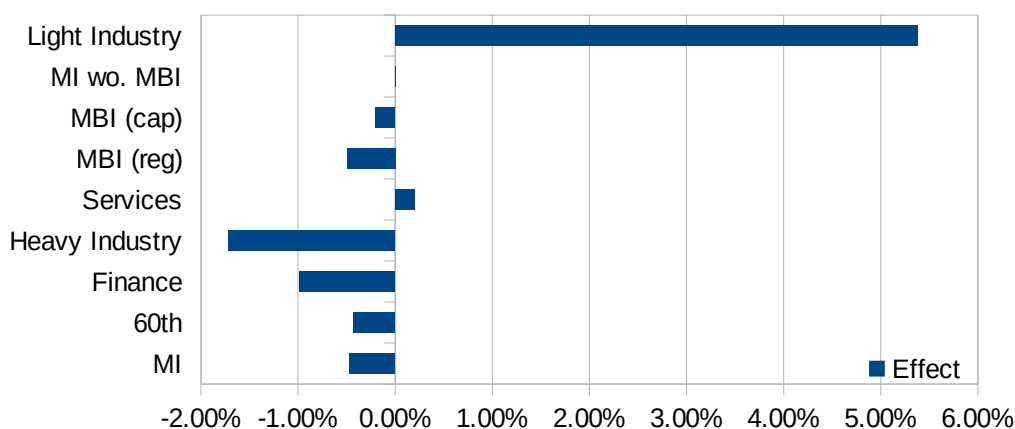
Source: Authors calculations

As it could be noticed, the change in the performance/seasonality of the indices is more affected by individual events than the Fee Free Investor Days, which, again, proves the H3. Despite being somewhat effective at elevating the volume, in author's opinion, Investor Days are not a sustainable strategy, but rather a short-term tactic to boost volume and increase the interest in investing in MSE.

7.Conclusion

The latest recalculation of the MBI10 index done on 16.12.2024 swapped UNI for REPL due to the higher liquidity caused by the REPL's stock split in combination with the great results in the past 2023 and the quarterly results in 2024. The authors have previously noticed this within the scope of the research, analyzing the included data. The methodology was fair enough to substitute UNI with REPL which could have a positive impact on the overall health of the capital market.

In the process of collecting, compiling, computing and analysis of the data, the authors came to a conclusion that there is no unified way of reporting - no standard/generic set of financial statements, although all the companies follow the common accounting standards. Every set of financial statement has somewhat different structure, including the audited ones from the same auditing agencies, because of the different structures of the business model and, therefore, the different financial situation in each company. The authors suggest that a common general ledger could be enforced by MSE or SEC regarding financial reports that would ease up the usage and processing of the data. Having the same structures in all sets of financial reports including a display of the accounts could help the scalability and reliability of the provided financial data into one unified document structure for all listed companies. These proposed reforms could also include unification of the name classification of the documents provided and the contents of the non-financial / price impacting information shared trough the MSE's platform SEINET. Additionally, companies should be incentivized to be more transparent, instead of paying for sharing information through the platform and play their role in improving the markets efficiency.

Another suggestion could be added, since financial reports are audited at the end of the year (EoY), implementing at least half year (Q) audited reports could be a benefit for minimizing the potential information asymmetry between insiders, shareholders and/or future investors.

The research results lead to a conclusion that the lack of market makers, the relatively low liquidity and high transactions fees contribute to the inefficiency of the overall market. Efforts to lower transaction fees matching the industry averages close to Western Europe or NYSE could significantly benefit market liquidity. The index with the mentioned free-float adjustments and its effect of focusing could influence not only the retail investors' decisions but also the institutional ones, partially favoring the more "free-floating" stocks, while feeding a liquidity thinning loop. In order to improve the index and correct the bias towards the more "free-floating" stocks, we suggest a legislative change for the public disclosure of majority

stakeholders that should be more transparent - publicly available majority stakeholders with at least 1%-0.1% of the total issued emission of the stocks instead of the current threshold at 5%, with daily changes, rather than the actual weekly updates by the Central Securities Depository.

Our overall ratio analysis led us to conclude that the overall stock market excluding MBI10 elements tend to be undervalued and the elements of MBI10 tend to be relatively overvalued in comparison to industry standards or global trends of the ratios analyzed, especially in the finance aggregate index.

Specific stock events such as the M&A transactions move the overall market and lead to spikes of interest away from the index (MBI10) to specific stocks such as OKTA or the stock split which lead REPL to replace UNI in the index in the latest revision.

Trying to prevent the tightening effect of the index, we suggest that an additional Market Index based on market capitalization should be added (or substitute) the MBI10 index. The Market Index should have certain safeguards (such as the one we applied in our stock picking process in order to include only relatively liquid stocks - at least 1% of the overall stock issued to have been traded in the previous year), to avoid a misguiding effect on the index, having in mind the inefficiencies of the market caused by illiquidity.

This reform could also shift the over-representation of the finance/banking sector in the current index with higher weight than the actual weight to the aggregate market. The inclusion of more elements to the new index with a broader sector base would lead the market to lower the overall chance of speculation trading by new retail traders and shorten the discrepancies with the overvaluation of the MBI10 elements compared to non MBI10 elements. Implying the institutional funds, such as the passive MBI10 funds, to invest in other elements could shift the trend of boosting the liquidity of relatively liquid stocks to become more liquid, but instead increase the overall market liquidity, which is one of the authors main concerns and aim of this paper.

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%D0%BA%D0%B0%D0%BF%D0%B8%D1%82%D0%B0%D0%BB%D0%BD
%D0%BE-%D1%84%D0%B8%D0%BD%D0%B0%D0%BD
%D1%81%D0%B8%D1%80%D0%B0%D0%BD%D0%BE-%D0%BF
%D0%B5%D0%BD%D0%B7%D0%B8%D1%81%D0%BA%D0%BE-%D0%BE
%D1%81%D0%B8%D0%B3%D1%83%D1%83%D0%B2%D0%B0%D1%9
A%D0%B5-%D0%BA%D0%BE%D0%BD%D1%81%D0%BE%D0%BB
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