

## THE EFFECTS OF THE ROMANIAN MARKET RECLASSIFICATION BY FTSE RUSSELL

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**Abstract.** *This paper analyses the effects of the Romanian market reclassification from the frontier market status to the secondary emerging status, realized by FTSE RUSSELL, one of the biggest three global index providers, in September 2020. The effects of the reclassification of a market by one of the three major global index providers have not been systematically studied, most of the studies focused only on the effects of stock market inclusion in different indexes. Our research concluded that the topic of this paper was not sufficiently studied as we only came across two other academic studies regarding the effects of market reclassification. However, the importance and influence of global index providers on capital allocation are the focus of recent research. Using Python – Jupyter Notebook we applied neural networks algorithms (long short-term memory) and evaluated the impact of the FTSE’s announcement on reclassification and the actual reclassification of the two most important Bucharest Stock Exchange indexes. The results show that these events generate a significant impact on the Bucharest Stock Exchange indexes we analyzed: the FTSE announcement about reclassification (which took place 1 year before actual reclassification) didn’t have a positive impact on them; however, the results also indicate that the actual reclassification had a positive impact on these indexes, in terms of returns and volatility. These findings are in contrast with the ones we found in the other two studies, a possible reason is that in the period of time that we analyzed the Romanian market there were two events with significant impact on returns and volatility: a significant change in Romanian regulations and the Covid-19 crisis.*

**Keywords:** *FTSE; global index providers; market reclassification; neural networks; Romania.*

### Introduction

The most important global index providers – MSCI, FTSE RUSSELL, and S&P DOW JONES INDICES - classify countries/markets in different categories, depending on their stage of development: frontier markets, emerging markets, and developed markets. MSCI utilizes an extra classification – standalone market – and FTSE RUSSELL differentiates between secondary and advanced emerging markets.

For a country to be classified in one of the mentioned categories it must fulfill a series of quantitative and/or qualitative criteria (and receive positive feedback during the investors’ consultation process). The criteria mentioned are: economic development, size, and liquidity , market accessibility criteria - used by MSCI, World Bank GNI per

capita rating, credit worthiness, market, and regulatory environment, foreign exchange market status, equity market status, clearing, settlement, and custody - used by FTSE RUSSELL, full domestic market capitalization size, annual turnover value, market development ratio (used by S&P DOW JONES INDICES for the initial eligibility analysis, to which other criteria are added in order to obtain emerging or developed market status).

The reclassification of a market – upgrading it to next market status - is a major event because it represents the result of the reforms undertaken by the stock exchange and the public authorities of a country, in order to comply with the criteria set by the global index providers and can lead to augmented capital inflows from international investors and to increased liquidity. A downgrade can also determine the authorities to engage in reforms consistent with the aforementioned criteria.

The investors also benefit from the results of the classification process by adapting their investment strategies depending on the market status changes operated by the global index providers.

This study aims to reveal and analyze the effects which the reclassification of the Romanian market by FTSE RUSSELL in September 2020 had on the Bucharest Stock Exchange (BSE) indexes – BET (Bucharest Exchange Trading) and BET –XT (Bucharest Exchange Trading Extended Index).

### **Literature review**

Miziolek (2018, p.144-145) argues that the relevance of global index providers has incrementally increased, under the impact of six factors: ‘the dynamic development of various forms and methods of investing in the financial market (...), the emergence of new financial instruments (...) a growing interest in new classes of assets (...), the development of electronic trading platforms (...), a growing specialization in financial markets (...), the development of research on financial markets’. The growing importance of global index providers in capital allocation is also highlighted and analyzed by Petry, Fichtner, and Heemskerk (2019, p.19) who concluded that MSCI, FTSE RUSSELL, and S&P DOW JONES INDICES are “actors that exercise growing private authority in capital markets as they steer investments through the indices they create and maintain”.

Furthermore, Petry and al. (2019, p.17) affirm that the power of the global index providers is also increasing in relation to states, the classification decisions having ‘enormous consequences for states and their national stock markets’ given the amounts of foreign capital that can be unlocked for investments in the case of a market status upgrade, or the disruption in investments flows that can be generated in a case of a market downgrade (as a consequence of lack of compliance with the recommendations made by the global index providers). Miziolek (2018) highlights this relation, including in the case of countries whose economies are significantly important globally, such as China.

Moreover, Petry (2020, p.13) claims that the global index providers ‘have become more powerful with the continuing shift from active towards passive investment where ETFs/index funds simply track or reproduce stock market indices’. Similarly, Miziolek (2018, p.145) affirms that the “huge increase in the popularity of index financial

products, assuming the form of investment portfolios” was due to the institutional investors - mainly ETFs - that started to largely resort to passive investing, considering the advantages of this type of investing.

In addition to the global influence on capital allocation, the reclassification process carried out by the global index providers can boost reforms regarding legislation and the market infrastructure. Hence, it can take several years for a country to be upgraded and attract more capital. This is why since 1997 MSCI has performed only 16 country upgrades (out of which 8 from standalone status to frontier/emerging) and why, starting from 2008 FTSE RUSSELL operated only 22 country upgrades (out of which 7 inclusions in frontier market status from previously “unclassified”).

The importance of market classifications for investors is also stated by Mendes and Martins (2017, p.1), who indicate that the classifications delivered, among others, by global index providers ‘have an influence on how the market is perceived by the financial world’.

However, the effects of market reclassification have not been largely addressed in academic articles, the most closely related to our own being the studies of Saidi et al.(2012) and Burnham et al. (2018).

Saidi et al. (2012) studied the capital markets reclassification of Egypt and Morocco by the MSCI Barra in 2001, from the frontier to emerging market status, analyzing how these markets performed in relation to three moments: the date of the announcement regarding the intention to upgrade the markets, the date of the actual market upgrade and one year after the upgrade. The results of this study show that the announcement of a market reclassification can generate an overshooting effect, but after the actual reclassification, the markets tend to follow a downward trend.

On the other hand, Burnham et al. (2018, p.77), who also observed the lack of a ‘systematic study of what happens around reclassification events’ conducted a larger study, analyzing 17 country reclassifications (9 upgrades and 8 downgrades) made by MSCI from 2000 to 2015, taking into consideration the same three moments, but also supply, demand, and index inclusion effects. The importance of these events is also stated by the authors, who affirm that the investors who are benchmarked to the MSCI indexes (with assets under management of nearly \$10 trillion) have to rapidly recalibrate their portfolios, which can lead to a large ‘collective action (...) the actual flows driven by reclassification being difficult to track’ (Burnham et al. 2018, p. 80). Their findings suggest, approximately in line with the conclusions of Said et al., that in the case of market upgrades, between the announcement date and the actual reclassification, the markets experience a positive trend (their MSCI country index gains, on average 23,2%), which is reversed one year after the actual reclassification (with a loss, on average, of 12,4%). In the case of downgrades, the markets face an opposite trend.

A general assessment of upgrades and downgrades in market status is made by Miziolek (2018, p.150), who states that in the case of upgrades, the capital reallocations are ‘usually positive (even though the weight of the country in a new index is lower than in the previous one)’, whereas in the case of downgrades are ‘usually negative (although the weight of the weight of the country in a new index is higher than in the previous

one)'. However, Miziolek does not focus on studying a specific case, only listing the examples of Greece (upgraded by FTSE RUSSELL in 2001, and downgraded in 2016), Israel, and South Korea (upgraded by FTSE RUSSELL in 2008, respectively 2009).

The effects of the Romanian market reclassification by FTSE RUSSELL, from frontier market to secondary emerging, have not been addressed so far, the subject only being referred to as a step in the evolution of the Bucharest Stock Exchange by Pop (2022), or in the context of how the Covid-19 crisis affected the performance listed companies on the BSE, by Vasiu and Ilie (2021).

Romania was included by FTSE RUSSELL on the watch list in September 2016, with the actual reclassification from frontier market to secondary emerging market taking place 4 years later, in September 2020 (with an announcement of reclassification in September 2019). The reclassification followed a series of reforms and actions both from BSE and the Romanian authorities, as pinpointed by Anghel and Mihalcea (2018, p.175): in 2014 ASF developed *STEAM project – Set of Actions Toward Establishing and Acknowledgement of the Emerging Market Status* and continued to improve the legislation and BSE started to develop and consolidate the market infrastructure.

Pop (2022, p.101) also pinpoints that the reclassification did not generate the expected effects, in particular an increase in foreign investors numbers at BSE, but without any analysis of how the market performed between the key dates regarding the upgrade (announcement, actual upgrade, the year after the upgrade).

Vasiu and Ilie (2021, p.117) only stated that after the upgrade decided by FTSE RUSSELL, the liquidity on BSE increased '3.5 times in September 2020, compared to the values of August 2020 or September 2019'.

However, Romania is still classified as a frontier market both by MSCI and S&P, further reforms and fulfilling a series of quantitative and qualitative criteria being required in order to obtain the emerging market status also from these global index providers.

## Methodology

The purpose of this research was to analyze the impact of both FTSE announcement about the reclassification of the Romanian Capital Market to Secondary Emerging (September 2019) and the actual reclassification (one year later) on two of the main index of the Bucharest Stock Exchange (BET and BET – XT). To do so, we applied an event study (the events being the announcement and the actual reclassification) using state of art algorithms from the field of neural networks.

We collected from BSE webpage (<https://bvb.ro>) BET and BET – XT daily data from 09/25/2015 to 09/24/2021. The total number of observations was 3000. Descriptive statistics about collected data are presented in *Table 1* and *Table 2*.

BET is the main index of the Bucharest Stock Exchange (BSE), reflecting the performance of the companies listed on the regulated market with the highest liquidity (except financial investing companies - FIC). BET includes 20 companies: FONDUL PROPRIETATEA S.A., BANCA TRANSILVANIA S.A., OMV PETROM S.A., S.N.G.N. ROMGAZ S.A., BRD – GROUPE SOCIETE GENERALE S.A., S.N. NUCLEARELECTRICA S.A., MEDLIFE

S.A., DIGI COMMUNICATIONS N.V., S.N.T.G.N. TRANSGAZ S.A., SOCIETATEA ENERGETICA ELECTRICA S.A., ONE UNITED PROPERTIES S.A., TERAPLAST S.A., C.N.T.E.E. TRANSELECTRICA S.A., TRANSPORT TRADE SERVICES S.A., AQUILLA PART PROD COM S.A., PURCARI WINERIES COMPANY LIMITED, BURSA DE VALORI BUCUREȘTI S.A., CONPET S.A., and SPHERA FRANCHISE GROUP S.A.

BET – XT reflects the price evolution of the most traded thirty companies listed on the regulated market of Bucharest Stock Exchange (BSE), including the fifth FIC. BET-XT includes: the 20 companies included in BET and 10 more (SIF BANAT CRIȘANA S.A., EVERGENT INVESTMENTS S.A., TRANSILVANIA INVESTMENTS S.A., SIF MUNTENIA S.A., SIF OLTENIA S.A., IMPACT DEVELOPER & CONTRACTOR S.A., BITTNET SYSTEMS S.A., COMPA S.A., SSIF BRK FINANCIAL GROUP S.A., and ROMCARBON S.A.).

**Table 1. Descriptive statistics BET**

| Mean    | Standard Error | Standard Deviation | Skewness | Kurtosis |
|---------|----------------|--------------------|----------|----------|
| 8477.34 | 36.8527        | 1427.3             | 0.8170   | 0.3695   |

**Table 2. Descriptive statistics BET - XT**

| Mean     | Standard Error | Standard Deviation | Skewness | Kurtosis |
|----------|----------------|--------------------|----------|----------|
| 770.3801 | 3.1616         | 122.4492           | 0.6065   | 0.0947   |

Firstly, we computed mean, standard deviation, skewness and kurtosis of the BET and the BET – XT returns registered in the following intervals: 09/26/2018 – 09/25/2019 (one year before the FTSE’s announcement about the reclassification of the Romanian Capital Market to Secondary Emerging); 09/26/2019 – 09/25/2020 (the interval between the FTSE’s announcement and the actual reclassification) and 09/28/2020 – 09/24/2021 (one year after the actual reclassification).

Next, using *Python – Jupyter Notebook*, we applied neural network algorithms in order to evaluate the impact of the FTSE’s announcement about reclassification and the actual reclassification on BET and BET-XT. According to Vonko (2022), neural networks are, in essence, algorithms that simulate the function of the human brain. Neural networks have some characteristics, such as self-training capacity, and data classification. In addition, probably the most important usage of neural networks is to make predictions based on historical data. The algorithm we applied in this study, developed by Bee Guan (2021), is part of the Long Short-Term Memory (LSTM) category. LSTM is a type of neural network algorithm, first developed by Hochreiter & Schmidhuber (1997), which is better than recurrent neural networks regarding the transmission/ storage of information in the process of doing predictions.

To apply Bee Guan’s algorithm we used for data training the daily value of BET and BET – XT for a period of 4 years (the equivalent of 1000 observations for each index). Then, using the characteristics of neural networks, the algorithm made predictions regarding the evolution of BET and BET – XT in the fifth year. Because of the fact that the purpose of this research is to evaluate the impact of the FTSE announcement and the actual reclassification, the analyzed intervals, both in the case of BET and BET-XT, were

between 2015 – 2020, respectively between 2016 – 2021. After we applied the algorithm, we computed the mean of prediction and the mean of BET and BET – XT values in the fifth year. We did that in order to evaluate if BET and BET – XT overperformed or underperformed compared to the predictions made by the algorithm. Finally, we analyzed the relevance of the results using the paired sample t-test (*t-test*).

Finally, we analyzed the impact of the analyzed events (the FTSE announcement and the actual reclassification) on the volatility of BET and BET-XT. To do so, we evaluated the jumps' dynamic and dimension in BET and BET – XT values. The analyzed interval was 09/26/2018 – 09/24/2021 (one year before the FTSE announcement and one year after the actual reclassification). Jumps were first introduced by Robert Merton, who adjusted the Black-Scholes model (1973) for option evaluation in a way that considers jumps. According to Merton (1976, pp.126-127), jumps are atypical events that produce a high dimension change in the asset price in a very short time between two observations. To identify jumps on BET and BET-XT, we applied, in *Python – Jupyter Notebook*, the Lee and Mykland (2008) test, adjusted by Lee, Naranjo, and Velioglu (2018). The Lee and Mykland test identifies jumps using the properties of Gumbel distribution. In addition, Lee and Mykland test compute the dimension of jumps ( $L_i$ ) as a ratio between returns and standard deviation. Lee, Naranjo, and Velioglu adjusted Lee and Mykland by proving that the value of  $K$  (which in the Lee and Mykland test is 10) is 16 for daily data.

## Results

As shown in *Table 1*, the results don't indicate a positive impact of the FTSE announcement about the reclassification of the Romanian Capital Market on returns and volatility of BET and BET-XT. So, after the FTSE announcement, the mean of the BET returns had dropped from 0.0585 to – 0.0118, while, in the case of BET-XT, the drop was from 0.367 to -0.211. Also, the standard deviation had increased from 1.2753 to 1.5267 (BET), respectively from 8.6512 to 11.2893 (BET-XT). However, the results indicate that the actual reclassification of the Romanian Capital Market positively impacted BSE. The mean of BET and BET – XT returns after the actual reclassification was 0.133 (BET) and 1.1834 (BET XT), values significantly higher than the ones registered before. Similarly, after the actual reclassification, BET and BET- XT returns' volatility (reflected by standard deviation) dropped. The dynamics of skewness and kurtosis confirm the previous statements about the evolution of volatility and returns.

**Table 3. Mean, Standard deviation, skewness and kurtosis**

|                    | BET                 |                      |                    | BET-XT |         |         |
|--------------------|---------------------|----------------------|--------------------|--------|---------|---------|
|                    | Before <sup>1</sup> | Between <sup>2</sup> | After <sup>3</sup> | Before | Between | After   |
| Mean               | 0.0585              | -0.0118              | 0.1337             | 0.367  | -0.211  | 1.1834  |
| Standard deviation | 1.2753              | 1.5267               | 0.7187             | 8.6512 | 11.2893 | 6.1998  |
| Skewness           | -2.3634             | -1.3972              | -0.0432            | -3.198 | -1.7278 | -0.3041 |

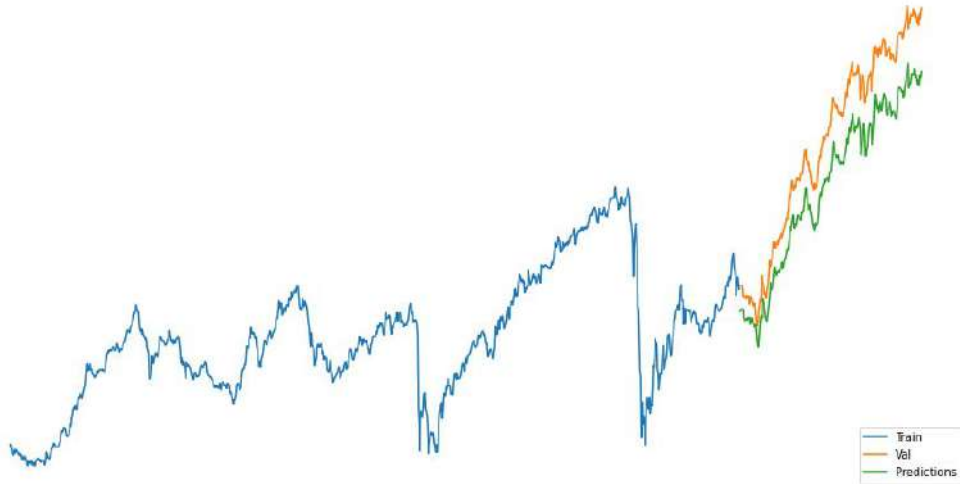
<sup>1</sup> One year Before FTSE announcement.

<sup>2</sup> Between FTSE announcement and effective reclassification

<sup>3</sup> One year after effective reclassification.

|          |         |         |        |         |        |        |
|----------|---------|---------|--------|---------|--------|--------|
| Kurtosis | 28.4225 | 10.5488 | 2.9266 | 39.4158 | 9.9276 | 2.0279 |
|----------|---------|---------|--------|---------|--------|--------|

The findings from *Table 3* regarding the impact of the two analyzed events on BET and BET-XT are, also, confirmed by the results obtained when applying the neural networks algorithm. Thus, the FTSE announcement didn't positively impact BET and BET-XT. Although, after the actual reclassification, BET and BET - XT had a higher than estimated growth, as you can observe in *Figure 1* and *Figure 2*.



**Figure 1. BET**



**Figure 2. BET - XT**

As shown in *Table 4*, the one-year mean of the BET and BET - XT values were higher after the actual reclassification than the predictions made by the algorithm. In the case of BET, the mean of the values was 10765.4851, while the mean of the estimated values

was 10225.959. Similarly, in the case of BET – XT, the mean of values was 954.4428, while the mean of estimated values was 949.23111. In addition, the differences between means (mean of the values and mean of the estimated values) have statistical significance (p-value is much lower than 5%), both in the case of BET and BET – XT.

However, regarding the period between the FTSE announcement and the actual reclassification, the mean of the BET and BET – XT values were lower than the estimated values (computed by applying the neural networks algorithm). The mean of BET values was 9052.4551, while the mean of the estimated values was 9070.9202. Moreover, the mean of BET – XT values was 826.6134, while the mean of the estimated values was 832.2301. Because the results didn't indicate a positive effect of the FTSE announcement on the BET and BET – XT values, we didn't apply a t-test for this interval (*Table 4*).

**Table 4. BET&BET-XT vs. Predictions**

|                       | BET           |             | BET - XT |            |
|-----------------------|---------------|-------------|----------|------------|
|                       | Between       | After       | Between  | After      |
| Values<br>(mean)      | 9052.455<br>1 | 10765.4851  | 826.6134 | 954.44428  |
| Predictions<br>(mean) | 9070.920<br>2 | 10225.959   | 832.2301 | 949.2310   |
| T-test<br>(p-value)   | -             | 2.5236E-127 | -        | 2.1487E-28 |

Regarding the jumps on BET and BET – XT, the results indicate a decrease in the number and the dimension of them in the period after the actual reclassification of the Romanian Capital Market. According to the results in *Table 5*, both in the one-year period before the FTSE announcement and in the period between the FTSE announcement and actual reclassification there were 4 jumps in BET. The number of jumps had decreased to 2 in the one-year period after the actual reclassification. Moreover, the mean of the dimensions of jumps (absolute values) had decreased after the actual reclassification, which (re)confirmed the positive impact of the events on reducing the volatility.

**Table 5. Jumps on BET (09/26/2018 – 09/24/2021)**

| <i>Before</i>  |            |            |            |            |
|----------------|------------|------------|------------|------------|
| Date           | 18.12.2018 | 21.12.2018 | 30.07.2019 | 26.08.2019 |
| Dimension      | 5.6751     | -4.9991    | -6.1521    | -12.4883   |
| <i>Between</i> |            |            |            |            |
| Date           | 30.10.2019 | 11.06.2020 | 12.06.2020 | 18.09.2020 |
| Dimension      | 5.8595     | -5.4188    | 5.1499     | 5.7783     |
| <i>After</i>   |            |            |            |            |
| Date           | 03.04.2021 | 30.08.2021 |            |            |
| Dimension      | -4.8286    | 4.9555     |            |            |

Referring to BET – XT, the impact of the actual reclassification was even higher, taking into consideration that there was no jump on this index in the one-year interval after the event. In the other two analyzed intervals, there were 4, respectively 5 jumps on BET – XT (*Table 6*).



**Table 6. Jumps on BET - XT (09/26/2018 – 09/24/2021)**

| <i>Before</i>  |            |            |            |            |            |
|----------------|------------|------------|------------|------------|------------|
| Date           | 18.12.2018 | 21.12.2018 | 30.07.2019 | 26.08.2019 |            |
| Dimension      | 5.8829     | -5.1945    | -5.5438    | -15.6437   |            |
| <i>Between</i> |            |            |            |            |            |
| Date           | 30.10.2019 | 10.06.2019 | 11.06.2020 | 12.06.2020 | 18.09.2020 |
| Dimension      | 5.4588     | 4.9261     | -4.8740    | 4.8749     | 5.8087     |
| <i>After</i>   |            |            |            |            |            |
| Date           |            |            |            |            |            |
| Dimension      |            |            |            |            |            |

## Conclusions

The FTSE reclassification of the Romanian Capital Market to Secondary Emerging is an extremely important event, which generates significant effects on BSE. The results indicate, in contrast with the ones found by Saidi et al. and Burnham et al., that the FTSE announcement about reclassification (which took place 1 year before actual reclassification) didn't have a positive impact on the main indexes of BSE. However, the results also indicate that the actual reclassification positively impacted BET and BET-XT regarding the returns and volatility. Thus, after the actual reclassification, the mean of BET and BET-XT returns was higher. In addition, the mean of the BET and BET-XT values were higher (with statistical significance) than the mean of the BET and BET-XT predicted values. These facts prove that BET and BET-XT overperformed after the actual reclassification. Moreover, the standard deviation of BET and BET-XT returns and the number of jumps on these indexes were lower than in the years before the actual reclassification, which indicates that the actual reclassification generated a decrease in the indexes' volatility.

This research has some limitations, one of the most important being the incapacity to quantify the extent in which BET and BET-XT dynamics were influenced by other factors (such as COVID-19, or the impact of the Emergency Government Ordinance 114/2018, which led to significant stocks' price drops, etc.) rather than the FTSE announcement or the actual reclassification.

However, given the growing influence of the global index providers, the shift in the investment industry, from active to passive, and with trillions of US dollars benchmarked against the indexes provided by MSCI, FTSE RUSSELL, and S&P DOW JONES INDICES, we consider that the effects of market reclassifications should be extensively studied.

## References

Anghel, L.C., & Mihalcea, A. D. (2018). Romanian Capital Market: On the Road toward an Emergent Market Status. In C. Brătianu, A. Zbucnea, & A. Vițelar (Eds.), *Proceedings*

of the *Strategica International Conference: Vol. 6.* (pp. 168-179). <https://strategica-conference.ro/wp-content/uploads/2022/05/15.pdf>

Bee Guan, T. (2021). *Predict Stock Price Using LSTM*. Github. [https://github.com/teobeeguan/Python-For-Finance/blob/main/Predict%20Stock%20Price%20Using%20LSTM/stock\\_price\\_lstm.ipynb](https://github.com/teobeeguan/Python-For-Finance/blob/main/Predict%20Stock%20Price%20Using%20LSTM/stock_price_lstm.ipynb)

Black F., & Scholes, M. (1973). The pricing of options and corporate liabilities. *Journal of Political Economy*, 81(3), 637 – 659. <https://www.jstor.org/stable/1831029>

Burnham T. C., Gakidis H., & Wurgler J. (2018). Investing in the Presence of Massive Flows: The Case of MSCI Country Reclassifications. *Financial Analysts Journal*, 74(1), 77-87. <https://doi.org/10.2469/faj.v74.n1.8>

Fichtner, J., Heemskerk, E., & Petry, J. (2019). Steering capital: the growing private authority of index providers in the age of passive asset management. *Review of International Political Economy*, 1-24. <https://doi.org/10.1080/09692290.2019.1699147>

Hochreiter, S., & Schmidhuber, J. (1997). Long Short-term Memory. *Neural computation*, 9, 1735-1780. <https://doi.org/10.1162/neco.1997.9.8.1735>

Ilie, L., & VasIU, D. E. (2021). The Covid 19 Crisis: Symptoms On The Romanian Capital Market. How The Covid 19 Pandemic Affected The Financial Performance Of Companies Listed On Bucharest Stock Exchange. *Revista Economica, Lucian Blaga University of Sibiu, Faculty of Economic Sciences*, 73(4), 115-126. <http://economice.ulbsibiu.ro/revista.economica/archive/73410vasiu&ilie.pdf>

Lee, J., Naranjo, A., & Velioglu, G. (2018). When do CDS spreads lead? Rating events, private entities, and firm-specific information flows. *Journal of Financial Economics*, 130(3), 556-578. <https://doi.org/10.1016/j.jfineco.2018.07.011>

Lee, S., & Mykland, P. (2008). Jumps in Financial Markets: A New Nonparametric Test and Jump Dynamics. *Review of Financial Studies*, 21(6), 2535-2563. <https://doi.org/10.1093/rfs/hhm056>

Martins, R. A. C., & Mendes B. V. M. (2017). Determinants of stock market classifications. *Applied Economics Letters*, 1-6. <https://doi.org/10.1080/13504851.2017.1414927>

Merton, R. (1976). Option pricing when underlying stock returns are discontinuous. *Journal of Financial Economics*, 3(1-2), 125-144. [https://doi.org/10.1016/0304-405X\(76\)90022-2](https://doi.org/10.1016/0304-405X(76)90022-2)

Miziolek, T. (2018). Index Providers in the Global Financial Market. *Acta Universitatis Lodzianis. Folia Oeconomica*, 3(335), 139-152. <https://doi.org/10.18778/0208-6018.335.10>

Naik, V., Prasad, A., & Saidi, N. (2012). From Frontier to Emerging: Does Market Reclassification Matter?. *SSRN Electronic Journal*.  
<http://dx.doi.org/10.2139/ssrn.1994623>

Petry, J. (2020). From National Marketplaces to Global Providers of Financial Infrastructures: Exchanges, Infrastructures and Structural Power in Global Finance. *New Political Economy*, 1-24. <https://doi.org/10.1080/13563467.2020.1782368>

Pop, C. (2022). Bucharest Stock Exchange Development Between 1995 and 2020. *Studia Universitatis Babeş-Bolyai Negotia*, 67, 71-112.  
Doi:10.24193/subbnegotia.2022.1.04

Vonko, D. (2022). *Neural Networks: Forecasting Profits*. Investopedia [online].  
<https://www.investopedia.com/articles/trading/06/neuralnetworks.asp>

FTSE RUSSELL (2022). *FTSE Equity Country Classification Process*.  
[https://research.ftserussell.com/products/downloads/FTSE\\_Equity\\_Country\\_Classification\\_Paper.pdf](https://research.ftserussell.com/products/downloads/FTSE_Equity_Country_Classification_Paper.pdf)

MSCI, (2022). *MSCI Market Classification Framework*.  
<https://www.msci.com/documents/1296102/6a6cbb4e-d14d-10a4-0cec-7a23608c0464>

S&P DOW JONES INDICES, (2021). *Country Classification Methodology*.  
<https://www.spglobal.com/spdji/en/documents/index-policies/methodology-country-classification.pdf>