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# PRICING MODEL FOR SHARES OF RESPONSIBLE ISSUERS AND RELATED CONFLICTS OF INTEREST[1]

## Introduction

The need to level out environmental and social risks to ensure sustainable development of territories requires a change in the strategy of production and economic activities, the modernization of fixed assets (the use of equipment that has a smaller ecological footprint) (Di Vaio, Palladino, Hassan, Escobar, 2020; Mio, Panfilo, Blundo, 2020). These activities are not possible without implementing both current costs and investments in fixed assets. In this regard, special mechanisms are being developed to attract financial resources for implementing environmental projects, in particular, green bonds (Karginova-Gubinova [Каргинова-Губинова], 2022; Gilchrist, Yu, Zhong, 2021). At the same time, it can be noted that existing financial instruments are also being transformed. In particular, previous studies have shown that an increase in the level of responsibility of a company affects the stock prices of its shares (see, for example, (Fernando, Sharfman, Uysal, 2017; Wong, Zhang, 2022).

In Russia, as in many developed countries, responsible issuers are emerging, although the adoption of corporate sustainability strategies is not yet widespread (Kanaev, Kanaeva, Belousov, 2018; Zhukova [Жукова], 2021). In order to identify factors constraining this process, it is necessary to determine what financial implications the transition to sustainability has for Russian companies. In particular, does the current market model allow the interests of responsible issuers and investors to be satisfied? With this in mind, the chosen topic can be relevant.

The aim of the work is to establish a pricing model for the shares of Russian responsible issuers and related conflicts of interest.

The subject of the study was exchange securities of companies implementing sustainable development strategies, the object — the peculiarities of the definition and dynamics of their prices.

The study used the values for 2017–2021 of the RSPP Sustainable Development Vector and Mos Exchange indices. The analysis was conducted using financial statistical methods, in particular, the logarithmic returns of both indices were calculated. To determine the stationarity of the indices was carried out KPSS-test. The presence or absence of autocorrelation was established with the help of Q-test of Ljung–Box. Next, the test for ARCH processes using the Lagrange multiplier test was conducted. The mentioned tests allowed to determine the current stock trading pattern of the responsible issuers' shares.

The novelty of the work was the study of the little-studied Russian market, establishing its compliance with the hypothesis of an efficient market or a random walk-in relation to the assets of companies implementing the strategy of sustainable development.

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The theoretical significance lies in the identification of interested and disinterested actors, as well as conflicts of their interests in relation to each of the models of pricing on the exchange. Understanding the existing divergence of interests and institutional aspects that hinder the transition to sustainable development will allow to develop effective measures and mechanisms to increase the level of responsibility of market participants and will lead to the economic, environmental and social security of territories. This makes up the practical significance of the work.

## Theory

Economic theory offers several hypotheses to explain stock market pricing patterns. According to Eugene Fama's efficient market hypothesis (Fama, 1970), the price of an asset is determined by the information available to investors. With a weak form of efficiency, quotes reflect past publicly available data, with a medium form — both past and current, with a strong form — all information, including insider information. J. Fama regarded investors as rational and considered their reaction as instantaneous. Besides, his stock exchange model assumed the absence of arbitrage and transaction costs.

Note that in his later works, in particular in (Fama, 1991), J. Fama noted that instead of the term «average form of efficiency» it is appropriate to use «event studies», and to determine its presence or absence — not tests on the predictability of events, but the event method of research. J. Fama considered it necessary to replace the notion of «strong form» by the influence of private information and to apply tests for assessing the impact of private information.

The model of random walk of prices of exchange assets was first proposed in 1863 by French economist Jules Regnault (Regnault, 1863). In the XX century, it was significantly developed by Maurice Kendall, Bradford Hill (Kendall, Hill, 1953) and Paul Cootner (Cootner, 1964) and became popular thanks to Burton Malkiel (Malkiel, 1973). This model assumes that stock prices are subject to random fluctuations and investors' income depends primarily not on their strategy, but on the movement of the stock exchange. Let us note that, understanding randomness as independence of changes in asset prices from each other (Brealey, Myers, Allen, 2010) or their unpredictability, regarding the efficient market hypothesis we can also talk about the randomness of quotes, but considering the objectives of this study in this paper to identify a weak form of efficiency we will consider dependence (randomness) on past publicly available information.

Hypotheses of both efficient market and random walk have been repeatedly criticized in economic theory. In particular, it was noted that it is necessary to consider the existing costs of obtaining and processing information, as well as other transaction costs in the exchange, because of the existence of which market prices are often not equilibrium, and full market efficiency is impossible (Grossman, Stiglitz, 1980).

As a result, adjustments to J. Fahm's concept of efficiency have emerged. In particular, as defined by Michael Jensen, market efficiency with respect to a certain information set exists when investors, using data from this set, have no regular opportunity to profit (Jensen, 1978). Allan Timmermann and Clive Granger have added to the definition by limiting the range of information collection technologies and predictive models (Timmermann, Granger, 2004).

In addition, the impossibility of describing all market processes with the help of the above two hypotheses have caused the development of alternative exchange models. The most popular of them was the adaptive market hypothesis developed in 2004 by Andrew Lo (Lo, 2004). This hypothesis provides that investors learn from their own mistakes and transform their behavior so that it best suits the changing environment. As a result, the relationship between risk and return, which is reflected in stock quotes, is unstable.

The fractal hypothesis, which has been authored by Benoit Mandelbrot and Richard Hudson, should also be noted. According to this hypothesis, current stock prices depend on their past values, and one should use the fractal theory in order to effectively forecast price changes (Mandelbrot, Hudson, 2006).

The difference in pricing models implies different opportunities for different groups of actors to realize their interests (see Table 1).

Table 1

**Actors interested or disinterested in different models**

| Exchange Trade Participants and Stakeholders | An efficient market model | The Random Wandering Market |
|---|---|---|
| Investors: interested in the model | Issuers with high sustainability indicators because of large quotations of their shares* | Issuers with low stability indicators that will not be «punished» by the market* |
| disinterested | Issuers with low sustainability indicators due to lower quotations of their shares* | Issuers with large sustainability indicators because of the impossibility of increasing the price of their shares because of the growth of corporate sustainability indicators* |
| Issuers: interested in the model | Responsible investors earning additional income*; passive investors whose trading strategy is suited to a market with a high proportion of high-quality securities | Passive investors earning average market returns |
| disinterested | Active investors, whose trading strategy is appropriate in the presence of overvalued and undervalued assets | Responsible investors who have no additional income*; active investors who cannot generate income above the market average |
| Other actors: interested in the model | Credit organizations that receive a correct evaluation of companies; environmentally responsible citizens and the state as a bearer of environmental interests (the market model encourages companies to implement sustainable development strategies)* | – |
| disinterested | – | Credit organizations, because the market does not form a correct assessment of companies; environmentally responsible citizens and the state as the bearer of environmental interests (the exchange does not help companies to implement sustainable development strategies)* |

* — *if there is a positive relationship between the level of stability of the company and its financial condition.*

*Source:* compiled by the author.

Note that this table is based on the assumption that there is a direct correlation between the level of company stability and its financial characteristics. To date, the most common point of view is the existence of a positive relationship between sustainability and financial condition (see, for example (Fernando, Sharfman, Uysal, 2017; Karginova-Gubinova [Каргинова-Губинова], 2021; Kotsantonis, Pinney, Serafeim, 2016; Wong, Zhang, 2022), although it is noted that previously this type of relationship had the opposite character (Kotsantonis, Pinney, Serafeim, 2016). For the reciprocal relationship, the interest of the actors marked with an asterisk in Table 1 would also be the opposite.

Both the efficient pricing model and the one based on random walk are accompanied by conflicts of interest. In particular, the interests of responsible issuers and investors, the state as the bearer of environmental interests are opposed to the interests of non-responsible

participants in exchange trading: the former are more suited to an efficient market, the latter to a random walk market.

The adaptive hypothesis can be seen as a shift from random straying to efficiency. With stable companies with good performance, more responsible issuers and investors will appear, which will gradually lead to the ratio of interests described for the efficient market model.

The stock exchange fractal hypothesis, to a greater extent, determines the methodology of forecasting the movement of market quotations, rather than the possibility of satisfying the interests of a certain group of actors. At the same time, of course, the possibility to build models that increase the efficiency of exchange trading makes fractal markets more suitable for active investors, less suitable — for passive investors and credit institutions, because the market price of assets may not correspond to its fundamentals. Responsible investors and companies pursuing a sustainability strategy may or may not generate additional income.

Previous studies have analyzed the validity of the considered hypotheses regarding the assets of responsible issuers on the stock exchanges of individual countries. In particular, it has been shown that the pricing of ESG stocks is more efficient compared to unrated stocks (Wu, Xiong, Gao, 2022). At the same time, analysis of the Dow Jones Sustainability Index in Korea, namely the presence of correlation of current prices with past prices, refutes even the weak form of the efficient market hypothesis for responsible issuers' assets (Ang, Weber, 2018).

The absence of a weak form of efficiency and random wandering of monthly returns has also been confirmed by data from the carbon-efficient stock market indices of Brazil, India, and the United States. At the same time, the monthly returns of a similar index in Japan do not fit the random walk hypothesis. Also, in all four of the aforementioned countries — Brazil, India, the United States, and Japan-there is no random walk in daily closing prices (Singh, Leepsa, and Kushwaha, 2016).

Another study confirmed that non-randomness of stock prices and returns is more likely to occur in the short run. At the same time, there is a correlation between performance and randomness of stock indices of responsible issuers with similar performance of all exchange assets in the country (Mondal, Singh, 2020).

According to the adaptive market hypothesis, the current factor load on asset returns can change, especially in developing countries, with increasing environmental awareness and literacy of investors and issuers. In particular, it has been shown that previously, before 2015, carbon risk was hardly significantly considered by markets (Andersson, Bolton, Samama, 2016).

The above review of works shows the possibility of the current sustainable asset trading model to both stimulate and discourage companies from implementing sustainability strategies. In addition, the existence of different models, more and less effective, in different countries regarding responsible companies' shares has been confirmed. Thus, in some countries, the stock model is more conducive to the transition to territorial sustainability, while in others it is less so.

Next, let us assess the extent to which the Moscow Exchange model meets the goals of sustainability.

## Methodology

Research methodology involved the use of theories of two scientific schools: neoclassical theory — rational finance (efficient market hypothesis and random walk hypothesis) and behavioral finance (adaptive market hypothesis).

In this paper, we used the values of the index RSPP Vector of Sustainable Development, calculated by the Moscow Stock Exchange. The basis for calculating this index is the stock quotes of issuers with the best dynamics of sustainable development characteristics. The Moscow Exchange Index was selected to determine the average market trends. The period from 2017 to 2021 was analyzed.

At the initial stage of the study, financial statistics methods were applied. For each day of the analyzed period, the logarithmic return of the index was calculated as the natural logarithm of the ratio of the closing price to the opening price.

Then by KPSS-test (Kwiatkowski–Phillips–Schmidt–Shin test; Kwiatkowski–Phillips–Schmidt–Shin) (Kwiatkowski, Phillips, Schmidt, Shin, 1992) stationarity of returns was estimated. The above test allows us to analyze the stationarity of both the level of a variable and its presence relative to a deterministic linear trend (trend stationarity). In this paper, the first option has been chosen. The assumption of stationarity of the variable under study is considered as the null hypothesis. The hypothesis is rejected if the critical value of the test statistic exceeds the calculated value and the p-value is greater than 0,1; 0,05 or 0,01 (depending on the selected level of statistical significance).

After that, the presence or absence of autocorrelation is determined based on the Q-test of Ljung–Box. The null hypothesis assumes that there is no autocorrelation (Ljung, Box, 1978).

In the next step, a test for ARCH processes (Engle, 1982), the Lagrange multipliers test (score test), was performed to detect autoregressive conditional heteroskedasticity (variability of variance).

Calculations for each of the tests (KPSS-test, Ljung–Box Q-test, and ARCH processes test) were performed separately by year and for lags from one to 10. The above tests do not require checking the normal nature of the data distribution.

## Results and discussion

As of the end of December 2021, the base for calculating the index RSPP Vector of Sustainable Development included shares of 26 Russian issuers, the largest number of which belonged to the oil and gas industry (PJSC Gazprom, PJSC Lukoil, PJSC Novatek, PJSC Rosneft Oil Company, PJSC Tatneft — for the latter, ordinary and preferred shares) (Table 2). The electric power industry (PJSC Federal Grid Company of the Unified Energy System, PJSC Federal Hydrogeneration Company — Rus Hydro, PJSC Inter RAO UES and PJSC Russian Grids) and the financial sector (AFK Sistema, Moscow Exchange, PJSC Sberbank and PJSC VTB Bank) were also actively represented.

Table 2

**The basis for calculating the RSPP index Sustainable Development Vector at the end of 2021**

| Industry | Number of shares |
|---|---|
| Oil and gas industry | 6 |
| Electricity | 4 |
| Finance | 4 |
| Casting, mechanical engineering and metalworking | 4 |
| Mining of other raw materials | 3 |
| Communication | 1 |
| Building | 1 |
| Trade | 1 |
| Transport | 1 |
| Chemical industries | 1 |
| Total | 26 |

*Source:* compiled by the author.

During 2017–2019, there was an increase in the logarithmic returns calculated based on the Mos Exchange and RSPP Sustainable Development Vector indices (see Figure 1). At the same time, large absolute values of returns were recorded for the former, while the latter had the highest growth rates (Figure 2). In 2020, perhaps because of the COVID-19 pandemic, the increase in stock returns slowed down, but for those of them included in the RSPP Sustainable Development Vector Index, there was no decrease in the logarithmic returns and their average value exceeded the same indicator for the stock exchange. At the same time, already in 2021, the yield ratio was restored: the logarithmic yield of shares of the Mos Exchange Index became higher than that of the assets of the RSPP Sustainable Development Vector Index.

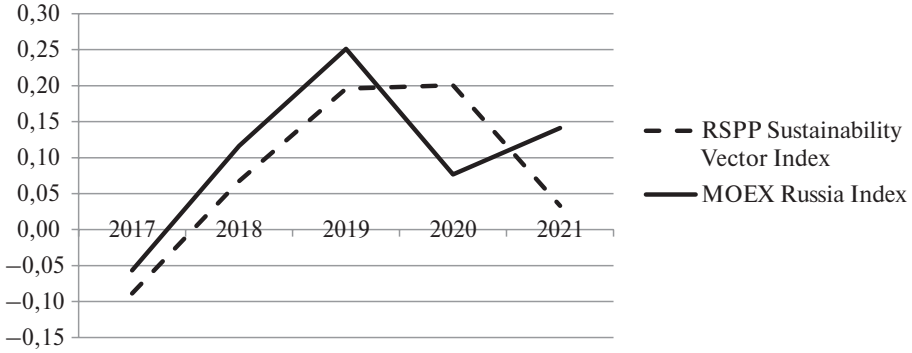


**Figure 1. Logarithmic Yield of Moscow Exchange indices**

*Source:* compiled by the author.

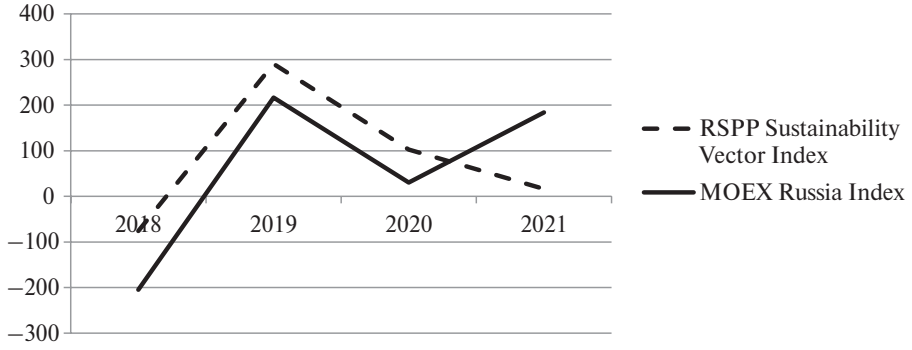


**Figure 2. Dynamics of yield changes of Moscow Exchange indices, %**

*Source:* compiled by the author.

Based on the above, we can conclude that currently the Moscow Exchange does not show a large yield of sustainable assets compared to the market average, although the dynamics of indicators before the COVID-19 pandemic allowed us to predict this soon.

An analysis of the results of the KPSS-test shows that during the analyzed period, the return of sustainable stocks included in the RSPP Vector Sustainability Index was non-stationary: the calculated value of the test statistic is less critical for the significance level of 5% and, respectively, 1%, the p-value exceeds 0,05 (critical values for significance levels of 5% and 1% are 0,462 and 0,739) (Table 3).

The absence of stationarity shows the variability of characteristics and, therefore, non-randomness of returns, which shows the compliance of the sector with the weak form of the efficient market hypothesis (refutation of the random walk hypothesis).

Table 3

**Value of the test statistics of the KPSS-test**

| Lag | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| 1 | 0,404 | 0,031 | 0,107 | 0,181 | 0,195 |
| 2 | 0,415 | 0,033 | 0,105 | 0,164 | 0,202 |
| 3 | 0,419 | 0,035 | 0,100 | 0,147 | 0,214 |
| 4 | 0,404 | 0,035 | 0,097 | 0,134 | 0,220 |
| 5 | 0,399 | 0,034 | 0,093 | 0,129 | 0,220 |
| 6 | 0,395 | 0,033 | 0,090 | 0,126 | 0,217 |
| 7 | 0,393 | 0,034 | 0,088 | 0,122 | 0,216 |
| 8 | 0,388 | 0,036 | 0,086 | 0,120 | 0,216 |
| 9 | 0,389 | 0,037 | 0,083 | 0,118 | 0,219 |
| 10 | 0.384 | 0.038 | 0.080 | 0.117 | 0.219 |

*Source:* compiled by the author.

However, it is interesting that in 2020 there was no autocorrelation of returns for lags four to nine (the null hypothesis is confirmed for lags five and seven at the statistical significance level of 1%; for the other listed lags — 5%) (see Table 4). Thus, there was a white noise in the market in 2020 (the yield was a random variable). This confirms the hypothesis of random walk and contradicts the hypothesis of an efficient market.

Table 4

**Results of the Ljung–Box Q-test**

| Parameter | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| 1 lag Ljung–Box Q' | 1,0109 | 0,4708 | 0,3564 | 1,1941 | 0,0010 |
| *p*-value | 0,315 | 0,493 | 0,551 | 0,275 | 0,975 |
| 2 lag Ljung–Box Q' | 2,3985 | 1,0665 | 0,4074 | 5,5093 | 0,6033 |
| *p*-value | 0,301 | 0,587 | 0,816 | 0,064 | 0,740 |
| 3 lag Ljung–Box Q' | 2,4232 | 1,7114 | 1,7170 | 11,5629 | 2,1421 |
| *p*-value | 0,489 | 0,634 | 0,633 | 0,009 | 0,543 |
| 4 lag Ljung–Box Q' | 5,4734 | 2,7065 | 2,0071 | 16,7559 | 2,2525 |
| *p*-value | 0,242 | 0,608 | 0,734 | 0,002 | 0,689 |
| 5 lag Ljung–Box Q' | 5,8401 | 5,4586 | 2,5734 | 19,8081 | 2,9208 |
| *p*-value | 0,322 | 0,363 | 0,765 | 0,001 | 0,712 |
| 6 lag Ljung–Box Q' | 5,8506 | 6,1190 | 2,9353 | 20,0924 | 3,5238 |
| *p*-value | 0,440 | 0,410 | 0,817 | 0,003 | 0,741 |
| 7 lag Ljung–Box Q' | 5,8772 | 11,4731 | 2,9413 | 23,5723 | 3,7287 |
| *p*-value | 0,554 | 0,119 | 0,890 | 0,001 | 0,810 |
| 8 lag Ljung–Box Q' | 6,4835 | 11,7723 | 3,1482 | 24,2341 | 3,7893 |
| *p*-value | 0,593 | 0,162 | 0,925 | 0,002 | 0,876 |

End of Table 4

| Parameter | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| 9 lag Ljung–Box Q' | 7,9483 | 11,8953 | 6,6205 | 24,2576 | 4,7712 |
| *p*-value | 0,539 | 0,219 | 0,677 | 0,004 | 0,854 |
| 10 lag Ljung–Box Q' | 9,7088 | 12,2942 | 6,6207 | 24,6862 | 5,3819 |
| *p*-value | 0,466 | 0,266 | 0,761 | 0,006 | 0,864 |

*Source:* compiled by the author.

The test for ARCH processes showed that ARCH processes were present in the market in 2017–2019 (Table 5). In 2020, for lags two through ten and significance level 1% and in 2021 for lags four through eight (significance level 1–5%) these processes were absent.

Table 5

**Results of the ARCH Processes Test**

| Parameter | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| 1 lag score test | 0,7190 | 2,7037 | 1,7069 | 2,1149 | 0,1535 |
| *p*-value | 0,396 | 0,100 | 0,191 | 0,146 | 0,695 |
| 2 lag score test | 0,7986 | 2,7621 | 1,4947 | 16,7035 | 0,1738 |
| *p*-value | 0,671 | 0,251 | 0,474 | 0,000 | 0,917 |
| 3 lag score test | 1,4937 | 2,8307 | 1,2249 | 21,2809 | 7,2024 |
| *p*-value | 0,684 | 0,418 | 0,747 | 0,000 | 0,066 |
| 4 lag score test | 4,3043 | 2,8238 | 2,6749 | 27,8653 | 13,9105 |
| *p*-value | 0,366 | 0,588 | 0,614 | 0,000 | 0,008 |
| 5 lag score test | 4,5441 | 2,8170 | 2,7214 | 32,9290 | 15,1411 |
| *p*-value | 0,474 | 0,728 | 0,743 | 0,000 | 0,010 |
| 6 lag score test | 6,5055 | 2,9290 | 2,9431 | 33,9768 | 15,3970 |
| *p*-value | 0,369 | 0,818 | 0,816 | 0,000 | 0,017 |
| 7 lag score test | 6,4202 | 3,5098 | 2,9704 | 33,9284 | 15,0285 |
| *p*-value | 0,492 | 0,834 | 0,888 | 0,000 | 0,036 |
| 8 lag score test | 7,6833 | 3,6387 | 5,8870 | 62,5489 | 15,5552 |
| *p*-value | 0,465 | 0,888 | 0,660 | 0,000 | 0,049 |
| 9 lag score test | 7,6673 | 3,7117 | 5,9558 | 62,5666 | 16,4070 |
| *p*-value | 0,568 | 0,929 | 0,744 | 0,000 | 0,059 |
| 10 lag score test | 10,7144 | 3,9696 | 6,0352 | 66,0623 | 16,4229 |
| *p*-value | 0,380 | 0,949 | 0,812 | 0,000 | 0,088 |

*Source:* compiled by the author.

The variance can be considered as an indicator of the volatility (variability) of the return on sustainable assets and a characteristic of the riskiness of investing in them. Accordingly, ARCH processes assume that there is the so-called «clustering of volatility»: periods of volatility of the variable level alternate with stable periods.

Based on the calculations made, we can conclude that in 2017–2019, the market for stable stocks was more volatile. Gradually, in the course of its formation and development, «volatility clustering» manifested itself to a significantly lesser extent, and now trading in such assets is less risky.

Summarizing the above, let us define a stable asset market model for each year of the analyzed period (Table 6).

Table 6

**Sustainable Asset Market Model**

| Financial characteristics of stable issuers | An efficient market model | The RandomWandering Market |
|---|---|---|
| Below the market average | 2017–2019, 2021 | |
| Above the market average | | 2020 |

*Source:* compiled by the author.

Considering the data in Table 1, in both cases, the market model corresponded to the interests of passive investors and companies with a low level of responsibility.

The got results, namely the weak form of efficiency of the Russian market of shares of responsible issuers in 2017–2019 and 2021 by daily closing prices confirm the results of the study analyzing the exchanges of Brazil, India, USA and Japan (Singh, Leepsa, Kushwaha, 2016). The quote randomness observed in 2020 also occurred in Korea (Ang, Weber, 2018), South Africa, and at some periods in Brazil (Mondal, Singh, 2020). The level of exchange prices of the assets of companies implementing sustainability strategies corresponds to the initial stage of ESG transformation (Kotsantonis, Pinney, and Serafeim, 2016). Under the adaptive market hypothesis, let us assume that in the future, investors and issuers will be more focused on sustainability criteria.

It should be noted that the limitation of the study is the methodology of calculation of the index RSPP Vector of Sustainable Development. The analysis of the calculation base showed that it includes assets of the largest Russian companies, which are «blue chips». Considering the desire of these companies to enter international markets of goods, services and capital, and ESG-requirements, put forward for this by developed countries, the specified base of the index is not surprising. On the other hand, it is obvious that blue chip stocks have their own stock exchange features, which, when analyzed, can affect the conclusions made on the assets of stable issuers, especially on the presence of ARCH processes. At the same time, although blue chips are the most reliable assets, in 2017–2019, those of them that belonged to the market of sustainable stocks were quite volatile. Thus, we see that the transformation of development strategies impacts the quotations of even the largest and most liquid stocks.

## Conclusions

Based on the non-stationarity and autocorrelation of stock returns of responsible issuers for 2017–2019 and 2021, we can conclude that the market for sustainable assets was weakly efficient during these periods. In 2020, although the returns were unsteady, their autocorrelation was absent, which confirms the consistency of trading with the random walk hypothesis. And it was in that year, amid white noise, that the stock returns of the

responsible issuers exceeded the market averages. This allows us to conclude that in the current realities, the non-financial aspects of companies' performance do not improve their stock performance.

At that the correlation of characteristics of effectiveness and randomness of trades, on the one hand, and yield of stable assets and average market indicators, on the other hand, testifies that during the whole analyzed period the market functioned in the interests of passive investors and issuers with low responsibility. This is because of their prevalence in the total number of exchange trading participants.

Also note that in 2017–2019, at an earlier stage of its formation, the market for sustainable stocks was riskier and there was a «clustering of volatility». Beginning in 2020, the exchange became more stable.

Future research is worthwhile to determine whether the decline in volatility is a continuing trend, and whether the inefficiencies in responsible issuers' asset trading can be considered a one-year phenomenon, likely related to the COVID-19 pandemic.

Thus, summarizing the results, we note that the current stock market model is not conducive to the introduction and implementation of corporate strategies for sustainable development and the economic, environmental and social security of territories. To ensure them, first, it is necessary not even to increase the openness of issuers and the spread of non-financial reporting, but to strengthen the level of responsibility of domestic investors. This requires joint action by regulators, non-profit organizations and businesses, and implies raising investors' awareness of environmental risks, their knowledge of the specifics of green financial instruments, the costs to businesses of greening their production and economic activities, etc.

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