

CORPORATE TRANSITION TO SUSTAINABLE LOW-CARBON DEVELOPMENT AS A FACTOR OF MARKET BENCHMARKS' DYNAMICS

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Abstract

Corporate transition to sustainable low-carbon development has an increasingly significant impact on all areas of modern society, including financial markets. The dynamics of market indicators begins to be influenced by new determinants, which defined the research purpose – to assess the impact of factors reflecting the corporate transition to sustainable low-carbon development on market benchmarks. The connection of individual companies' indicators with the introduction of new cost and investment management practices should mean that market benchmarks start depending on new factors. Verification of this assumption deserves independent attention being commonly accepted by default in existing studies. Given this gap, we tested if the factors associated with the corporate transition to sustainable low-carbon development have a significant influence on a market benchmarks. Accordingly, the indices of the largest emerging market in Eastern Europe (Moscow Exchange IMOEX and RTSI) were alternately applied as market benchmarks. Corresponding hypotheses were tested in two stages: before the adoption of the UN sustainable development goals and the Paris climate agreement (from 2012 to 2015) and after the introduction of these global initiatives (from 2016 to 2021). The research showed that several factors associated with corporate transition to a sustainable low-carbon development (the Russian Responsibility and Openness Index (MRRT), the European ESG Index (FTSE4Good EB), futures contracts for EU carbon units and natural gas) have a significant impact on market benchmarks. Noteworthy, in the period after 2015, the relative importance of these factors increases.

Keywords: sustainable development, low-carbon development, carbon market, market benchmarks.

1 Introduction

The corporations transition to sustainable low-carbon development has an increasingly significant impact on all areas of modern society, including financial markets. Public companies are increasingly implementing the principles of sustainable low-carbon development. Thus, almost half of the largest public companies in the world (942 out of 2,000) have made voluntary commitments to achieve carbon neutrality [1]. Simultaneously, the UN principles of responsible investment are adopted by over 4,900 leading investors, who manage assets worth more than 120 trillion US dollars [2].

Under the impact of these processes, information requests of financial market participants change. Therefore, the dynamics of market indicators begins to be influenced by new determinants, which defined the research purpose – to assess the impact of factors reflecting the corporate transition to sustainable low-carbon development on market benchmarks. Correspondingly, the following tasks were set and solved: to systematize the research on the impact of the corporate transition to sustainable low-carbon development on their investment characteristics; to formulate hypotheses about the factors' impact on the corporate transition to sustainable low-carbon development on market benchmarks; to test these hypotheses; to propose recommendations for the development of methodological approaches to investment analysis and regulation of financial markets.

2 Literature Review

Having systematized the research on the impact of the corporate transition to sustainable low-carbon development on their investment characteristics, the authors concluded that the problem of the impact of new factors on the performance of financial markets is considered in the scientific literature from different points of view.

A significant number of studies have focused on the impact of business ESG awareness on market capitalization. For instance, Zumente and Bistrova [3] confirm the positive impact of the ESG profile of companies on the formation of their shareholder value by the results of content analysis of scientific works, also revealing significant changes in the formulation of the business mission of companies in Central and Eastern Europe that have occurred since 2012 to 2021.

Another popular area of research is the comparative cost of debt financing using traditional methods [see, for instance, 4; 5] and green instruments, including it is confirmed that green bonds allow raising funds on more favorable terms. A recent study by Lau et al. [6], based on a global review of bond market statistics, proves the existence of this phenomenon, demonstrating that the average level of green premiums currently remains insignificant. Antonov [7], as well as Vymyatnina and Chernih [6], come to comparable conclusions and offer a broader formulation of the question, estimating environmental risk premiums in the Russian stock and bond markets.

At the same time, the issues of the processes of transition impact to sustainable low-carbon development on market benchmarks, as a rule, are not studied directly. For example, the STOXX Europe 600 index was used in a study by Sasse et al. [8] to form a sample of companies to assess the impact of ESG factors on corporate risk. Another study that used the market index (Dow Jones Sustainability World Index) as the basis

for selecting companies was the work of Aureli et al. [9]. The main goal of this study was to evaluate the quality of ESG information disclosure on the investment attractiveness of a business.

In those studies that are directly devoted to the dynamics of market benchmarks, traditional macroeconomic indicators receive priority attention. Thus, Anufrieva's analysis showed that for the Russian market in the period from February 2009 to December 2018, the significant factors in the profitability of market indices were the USD / RUR rate, the volume of industrial production in the Russian Federation, the average three-month rate of the national interbank market, global industrial production, global inflation rate and the yield of three-month US Treasury bonds [10].

Bhuiyan and Chowdhury, using data for the period from 2000 to 2018, found that the US composite and sectoral stock indices are strongly dependent on such national macroeconomic indicators as the money supply and the interest rate; the same factors are significant for Canadian stock indices, which, at the same time, do not show dependence on similar internal macroeconomic parameters [11].

Accordingly, firstly, the dynamics of market benchmarks can be determined by both external and internal factors. This situation is confirmed by the results of a study by Borochkin, who evaluates the volatility of stock indices of 22 countries in Europe, America, Asia, Africa, Australia and Oceania [12]. Secondly, national specificity is important. It is logical to assume that for fuel-exporting countries, the prices of relevant commodities will have a significant impact on the most important financial parameters. For example, in a study by Filimonova et al., it is proved that oil rent has a significant impact on the economy of producing countries [13].

Thus, on the one hand, the revealed relationship of market indicators for individual companies (capitalization, required return, corporate risk, etc.) with the results of the new business strategies should lead to the fact that market benchmarks will become dependent on factors associated with the transition to sustainable low-carbon development (hereinafter referred to as sustainable factors). On the other hand, verification of the proposed assumption deserves independent attention. Therefore, in this study, a series of hypotheses about the influence of sustainable factors on market benchmarks was formulated and tested. Generalization and critical analysis of studies devoted to macroeconomic factors of market benchmarks dynamics, in turn, made it possible to choose relevant predictors.

3 Methodology of the research

The revealed connection of market indicators of individual companies with the results of the introduction of new cost and investment management practices should mean that market benchmarks begin to depend on new factors. Verification of this assumption deserves independent attention but is accepted by default in existing studies. Given this gap, we formulated and tested the main hypotheses which can be formulated as follows:

H₀: factors associated with the corporate transition to sustainable low-carbon development have a significant influence on a market benchmark;

H₁: these factors do not have a significant influence on a market benchmark.

The main hypotheses were decomposed into four pairs of sub-hypotheses: a) the indices of the largest emerging market in Eastern Europe (the Moscow Exchange Russia Index (IMOEX) and the RTS Index (RTSI)) were alternately used as market benchmarks; b) corresponding hypotheses were tested in two stages: before the adoption of the UN sustainable development goals and the Paris climate agreement (from 2012 to 2015) and after the introduction of these global initiatives (from 2016 to 2021).

Therefore, the following sub-hypotheses were obtained:

1) *The tested hypotheses before the adoption of the UN sustainable development goals and the Paris climate agreement for the IMOEX:* H₀₁: from 2012 to 2015, factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the IMOEX; H₁₁: from 2012 to 2015, factors associated with the corporate transition to sustainable low-carbon development do not have a significant influence on the IMOEX.

2) *The tested hypotheses before the adoption of the UN sustainable development goals and the Paris climate agreement for the RTSI:* H₀₂: from 2012 to 2015, factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the RTSI; H₁₂: from 2012 to 2015, factors associated with the corporate transition to sustainable low-carbon development do not have a significant influence on the RTSI.

3) *The tested hypotheses after the adoption of the UN sustainable development goals and the Paris climate agreement for the IMOEX:* H₀₃: from 2016 to 2021, factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the IMOEX; H₁₃: from 2016 to 2021, factors associated with the corporate transition to sustainable low-carbon development do not have a significant influence on the IMOEX.

4) *The tested hypotheses after the adoption of the UN sustainable development goals and the Paris climate agreement for the RTSI:* H₀₂: from 2016 to 2021, factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the RTSI; H₁₂: from 2016 to 2021, factors associated with the corporate transition to sustainable low-carbon development do not have a significant influence on the RTSI.

The predictors were divided into three groups: sustainable, high carbon and risk factors. These factors and their abbreviations are presented in the Table 1.

Table 1. The predictor used to test the formulated hypotheses.

Group	Predictor	Abbreviation
1 Sustainable factors (Reflect the dynamics of the transition to sustainable low-carbon development)	1.1 Responsibility and Transparency Index, Russia	MRRT
	1.2 Sustainability Vector Index, Russia	MRSV
	1.3 FTSE4Good Global Benchmark, Great Britain	SGB
	1.4 FTSE4Good Europe Benchmark, European Union	SE

	1.5 Futures contract for carbon units traded in the European Union Emission Trading System (EU ETS)	CU
	1.6 Futures contract for natural gas	NG
2 High carbon factors (Allow to reveal increased carbon footprint)	2.1 Oil futures contract (Brent)	B
	2.2 Coal futures contract	C
	2.3 Futures contract for aluminum with a high carbon footprint (according to classification: metal)	A
3 Risk factor (Associated with the level of the risk-free interest rate for the Russian financial market)	3 Yield of ten-year Russian federal loan bonds (OFZ)	R

Source: created by the authors.

The methodology of data collection and the hypotheses testing included the following stages. *At the first stage*, the monthly values of market closing prices for the specified instruments (see Table1) were summarized. *At the second stage*, the coefficient of paired linear correlation of each predictor with explicable indicators was calculated to construct a correlation matrix using empirical data for the periods before and after the adoption of the UN sustainable development goals and the Paris climate agreement. A correlation matrix was constructed for correlation analysis. The results obtained to determine the tightness of the connection were interpreted using the Cheddock scale, which made it possible to identify significant factors. *At the third stage*, four multi-factor models of market benchmarks were developed (for the IMOEX and the RTSI and for two analyzed periods correspondingly). The models included revealed significant factors, the set of which was optimized taking into account the P-value of an F-statistics.

4 Research Results

The research primarily confirmed the main hypothesis put forward. In particular, several factors associated with the transition to a sustainable low-carbon development were found to have a significant impact on the market benchmarks. The obtained results are represented in more detail below.

1) From 2012 to 2015, three factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the Moscow Exchange IMOEX. These factors are represented in the *Model 1*:

$$IMOEX_1 = 0.18 * SE + 20.9 * CU - 90.74 * NG - 26.39 * R + \varepsilon(1)$$

where IMOEX₁ – MOEX Russia Index for the period from 2012 to 2015,

SE – FTSE4Good Europe Benchmark,
 CU – futures contract for carbon units traded in the EU ETS,
 NG – futures contract for natural gas,
 R – yield of ten-year Russian federal loan bonds.

2) From 2012 to 2015, factors associated with the corporate transition to sustainable low-carbon development do not have a significant influence on the RTSI. The dynamics of the index is determined mainly by high carbon factors, as well as a risk factor (see: *Model 2*).

$$RTSI_1 = 3.2 * B + 6.0 * C + 0.2 * A - 47.4 * R + \varepsilon \quad (2)$$

where $RTSI_1$ – RTS Index for the period from 2012 to 2015,
 B – oil futures contract,
 C – coal futures contract,
 A – futures contract for aluminum with a high carbon footprint,
 R – yield of ten-year Russian federal loan bonds.

3) From 2016 to 2021, the Moscow Exchange IMOEX is significantly depended on the factor associated with the corporate transition to sustainable low-carbon development (specifically futures contract for carbon units traded in the EU ETS) as well as on the risk factor. The corresponding dependence is shown in *Model 3*.

$$IMOEX_2 = 33,9 * CU - 116,5 * R + \varepsilon \quad (3)$$

where $IMOEX_2$ – MOEX Russia Index for the period from 2015 to 2021,
 CU – futures contract for carbon units traded in the EU ETS,
 R – yield of ten-year Russian federal loan bonds.

4) From 2016 to 2021, two factors associated with the corporate transition to sustainable low-carbon development have a significant influence on the RTSI. The risk factor is also relevant as in the previous cases (*Model 4*).

$$RTSI_2 = 0.21 * MRRT + 0.24 * SE - 28.21 * R + \varepsilon \quad (4)$$

where $RTSI_2$ – RTS Index for the period from 2015 to 2021,
 MRRT – Responsibility and Transparency Index (Russia),
 SE – FTSE4Good Europe Benchmark,
 R – yield of ten-year Russian federal loan bonds.

The main research results are represented in the Table 2.

Table 2. Significant factors of the market's benchmarks dynamics.

Model #	Depended variable	Period	R-square	Sustainable factors (relation)	Other factors (relation)
1	IMOEX	2012-2015	0.78	- FTSE4Good Europe Benchmark (positive) - Futures contract for carbon units traded in the EU ETS (positive) - Futures contract for natural gas (negative)	Risk factor (negative)
2	RTSI	2012-2015	0.97	None	High carbon factors (positive) Risk factor (negative)
3	IMOEX	2016-2021	0.92	- Futures contract for carbon units traded in the EU ETS (positive)	Risk factor (negative)
4	RTSI	2016-2021	0.92	- Responsibility and Transparency Index (Russia) (positive) - FTSE4Good Europe Benchmark (positive)	Risk factor (negative)

Source: created by the authors.

5 Discussion

The research contributes to a methodology for assessing the impact of a corporate transition to sustainable low-carbon development of financial markets. The assessment of such an impact should not be limited to the identification of ESG factors of capitalization of public companies, as it is presented, for instance, in the research review to which the article by Zumente and Bistrova addresses [3]. At the same time, this impact is not limited to the return of sustainable assets and the parameters of the investment portfolio, which expands the problems investigated by Lau et al. [6], Antonov [7], Vymyatnina and Chernih [8], etc.

The research also confirms the independent significance of testing market benchmarks depending on the relevant factors, the choice of which has confirmed its relevance for the Russian market and can be tested in other conditions. This contributes to the methodology of emerging markets assessment [15] and opens up broader prospects for the research of macroeconomic factors of market benchmarks dynamics, which in such studies as, for instance, Anufrieva [11], Bhuiyan and Chowdhury [12], Borochkin [13], are limited to traditional indicators. Besides, it is shown that the task of assessing the impact of sustainable factors on market benchmarks requires special attention, whereas in the studies of Sassen et al. [9], Aurelia et al. [10] and similar others, it is auxiliary. It should be stressed that in the period after 2015, the relative importance of sustainable factors of the studied market benchmark dynamic increases. Therefore, recommendations for investment analytics and regulators were proposed. When formulating them, the UN Principles for Responsible Investment [16] were taken into account.

Recommendation #1: it should be relevant to promote sustainable issues within the investment industry by investment analytics and regulators;

Recommendation #2: appropriate disclosure on sustainable issues by investors and regulators is needed;

Recommendation #3: it is advisable to apply sustainable factors in investment analysis and decision-making process not only when it comes to sustainable investments;

Recommendation #4: it is necessary to cooperate efforts of investment analytics and regulators to monitor sustainable factors;

Recommendation #5: research of sustainable factors should be continued combining efforts of professionals and academics.

It should also be noted that sustainable factors can integrate a wide range of business characteristics – not only its environmental profile, but, for instance, the quality of labor resources [17], the digital maturity of corporate management [18], its flexibility [19], proactivity [20], etc. This problem requires further investigation.

6 Conclusion

The research allowed to assess the impact of factors reflecting the corporate transition to sustainable low-carbon development on market benchmarks. The research methodology was developed taking into account systemized research on the impact of the corporate transition to sustainable low-carbon development on their investment characteristics. It was presumed that factors associated with the corporate transition to sustainable low-carbon development have a significant influence on a market benchmarks, specifically the MSCI and RTSI. Correspondingly, four pairs of sub-hypotheses were formulated and tested. By means of correlation and regression analysis, the main research hypothesis was primarily confirmed.

Combining the obtained results, it should be noted the following:

1) In the context of the studied market, factors associated with the corporate transition to sustainable low-carbon development (sustainable factors) have a significant influence on a market benchmarks. In the period after 2015, the relative importance of these factors increases.

2) Significant sustainable factors comprised by the FTSE4Good Europe Benchmark, futures contract for carbon units traded in the EU ETS, futures contract for natural gas, and the national Responsibility and Transparency Index. The set of significant factors and their significance differs for the benchmarks and studied periods. This may reflect the emerging nature of sustainable agenda.

3) Noteworthy, national sustainable factor became significant after 2015, while European indicators were always significant except for one case (RTSI for the period from 2012 to 2015). It also should be stressed that almost all significant sustainable factors are positively related with the market benchmarks.

4) Further research should take into account two major issues. The futures contract for natural gas has a negative relation with the market benchmark (IMOEX for the period from 2012 to 2015). The benchmarks are negatively depended on the risk factor. For the RTSI, this dependence is determining.

The study results have the practical importance for investment analysis and can also be used to regulate financial markets. In particular, the recommendations for investment

analytics and regulators were proposed that may contribute to the development of methodological approaches to investment analysis and regulation of financial markets.

7 Acknowledgements

This work was supported by Saint-Petersburg State University research grant (pr. No GZ_MDF_2023-1, pure ID 101662710).

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