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# CORRELATION OF RANKS BETWEEN ETHICAL BEHAVIOUR OF FIRMS AND COMPETITIVENESS OF ECONOMY

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## *Abstract*

The article deals with the estimation of the level impact of the ethical behaviour of firms on economies' competitiveness. It tests the hypothesis about the correlation of ranks between two order variables: the ethical behaviour of firms and economies' competitiveness. The research is based on data presented in The Global Competitiveness Reports of the World Economic Forum for 2006–2007 and 2017–2018. Two indicators for 116 economies are selected from the above reports, namely The Global Competitiveness Index and Ethical behaviour of firms. The choice of the economies arises from the fact that data on these particular countries are contained in both reports simultaneously. For each time period, the authors take economies with ranks from 1 to 116 for Global Competitiveness Index and Ethical behaviour of firms according to the reports. The authors measure the statistical relationship between the two order variables in 2006–2007 and 2017–2018 using a sample value of concordance coefficient. The results testify to a strong correlation of ranks between the two variables: the ethical behaviour of firms and economies' competitiveness. The authors estimate the statistical significance of the obtained sample values of concordance coefficient by Pearson's chi square test. The results show that the relationship between the analyzed order variables is statistically significant. It is concluded that the ethical behaviour of firms has a significant impact on firms' competitiveness, as well as on economies' global competitiveness.



**Keywords:** Firm, ethics, competitiveness, economy, rank correlation.

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## 1. Introduction

Today ethics is the focus of attention of religious and charitable organizations and politicians, as well as many scientists all over the world, due to its significant impact on economics. Ethics and ethical behaviour can be studied at multiple levels: that of individuals, business and the government, and on a global scale. Scientific literature investigates various sides of ethics and ethical behaviour. Thus, for example, Shleifer (2004) examines the influence of competition on the ethical behaviour of firms, O'Fallon and Butterfield (2005) study trends in the ethical decision-making literature, Clegg, Kornberger, and Rhodes (2007) develop a conceptualization of business ethics as practice, Cremer, Dick, Tenbrunsel, Pillutla, and Murnighan (2011) advocate a behavioural business ethics approach, Chell, Spence, Perrini, and Harris (2016) address the ethical nature of social enterprises, McMurrian and Matulich (2016) investigate how business ethics affects the firm's profitability, Medeiros et al. (2017) examine the effectiveness of current approaches to ethics education.

The article (Clegg, Kornberger, & Rhodes, 2007) underlines the complex nature of ethics: "ethics cannot be encapsulated in lists of rules that inform action; thus, there can be no 'one best way' in which good ethics may be guaranteed through prescription, judgement or legislation" (Clegg, Kornberger, & Rhodes, 2007, par. 4, p. 119).

## 2. Problem Statement

The issues of the ethical behaviour of firms are addressed in a considerable number of scientific papers. Scientists show that the level of a firm's ethical behaviour affects the firm's competitiveness and economic performance. McMurrian and Matulich (2016) note that "High standards of organizational ethics can contribute to profitability by reducing the cost of business transactions, building a foundation of trust with stakeholders, contributing to an internal environment of successful teamwork, and maintaining social capital that is part of an organization's market-place image" (par. 2, p. 83).

A firm's ethical behaviour is important for all stakeholders: consumers, business partners, investors, the government, etc. (Montgomery & Ramus, 2003; Pruzan, 2001). There is even the term "ethical consumer" to describe people reacting positively or negatively to what they regard as the ethical or unethical behaviour of firms (Pruzan, 2001). It is interesting to know that more than a half of consumers in Denmark were among ethical ones in 2001 (Pruzan, 2001).

The unethical behaviour of firms can lead to worsening of their reputation, which is an important intangible asset. "Decline in corporate reputation is a substantial threat, with an impact on many aspects of corporate performance. Disrepute is generally hard to recover/improve, and negative effects of disrepute for corporations are often unpredictable. At the same time, corporate reputation depends on particular actions of top managers and employees, therefore, decision making requires corporate ethics and social responsibility" (Bakumenko & Sigal, 2018, par. 4-5, p. 113). Stern, Zinkhan, and Jaju (2001) underline that a firm's reputation reflects the interests of certain groups and their values, as well as their access to information which is controlled (for instance, public relations, annual reporting, and advertisements) or not controlled (for example, investigative reports and rumours) by the firm. "Therefore, corporate reputation

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cannot be totally controlled and depends on corporations' actions, which makes ethics essential" (Bakumenko & Sigal, 2018, par. 2, p. 117).

Research of ethics is also interesting at macroeconomical level – the level of national economies. It is important to understand how significant the ethical behaviour of firms is for successful economic performance.

## 3. Research Questions

Firms are separate bricks of the building of a national economy. No economy can compete without competitive enterprises. As it is noted previously, the level of a firm's ethical behaviour affects the firm's competitiveness. It is interesting to estimate how strong the impact of the ethical behaviour of firms is on economies' competitiveness. The given article deals with the above issue.

## 4. Purpose of the Study

The purpose of the study is to test the hypothesis about the correlation of ranks between two order variables: the ethical behaviour of firms and economies' competitiveness. To achieve this objective, one has to perform the following tasks: to draw samples for the research; to calculate corresponding statistical indicators to either confirm or reject the hypothesis; to check the level of statistical significance of the results; and to draw conclusions.

## 5. Research Methods

The research is based on data presented in The Global Competitiveness Reports of the World Economic Forum for 2006–2007 and 2017–2018 (The Global Competitiveness Report, 2007, 2018). To test the hypothesis, two indicators for 116 economies, namely The Global Competitiveness Index and Ethical behaviour of firms, have been selected from the above reports.

In statistics (in particular, during the organization and statistical processing of expert research systems), one applies rank correlation analysis to measure and analyze statistical relationship between several rankings (orderings) of the same finite set of objects under study. It is the value of Kendall's coefficient of concordance that allows measuring the statistical relationship between several order variables. It is usually Pearson's chi square test that provides the assessment of the statistical significance of a sample value of concordance coefficient (Aivazian & Mkhitarian, 1998). We used the given criteria in our research to test the hypothesis about the correlation of ranks between the two order variables: the ethical behaviour of firms and economies' competitiveness.

## 6. Findings

The Global Competitiveness Index (GCI) is a complex index which was annually calculated until 2018 by the World Economic Forum for the majority of economies and which consists of over 100 components grouped into 12 pillars (The Global Competitiveness Report, 2017). GCI describes the competitiveness of economies on a global scale. The Global Competitiveness Report 2017–2018 defines

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competitiveness as "the set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the economy can achieve" (The Global Competitiveness Report, 2017, par. 3, p. 11). The year 2018 saw a change in GCI's calculation procedure, with the World Economic Forum starting to compute a modified measure – The Global Competitiveness Index 4.0 (The Global Competitiveness Report, 2018).

Ethical behaviour of firms (EBF) is one of over 100 components of The Global Competitiveness Index. It is part of the first pillar named "Institutions" and features a separate component in The Global Competitiveness Reports until 2018. The Global Competitiveness Index 4.0 does not include Ethical behaviour of firms as a separate component, which explains our choice of the time periods for the research (2006–2007 and 2017–2018).

To conduct the research, from the reports (The Global Competitiveness Report, 2006, 2017) we have extracted The Global Competitiveness Index and Ethical behaviour of firms for 116 economies (see Tables 01 to 02). Our choice of the economies arises from the fact that both reports (2007–2008 and 2017–2018) contain data on these countries simultaneously.

Tables 01 to 02 show each economy with ranks from 1 to 116 for GCI and EBF (The Global Competitiveness Report, 2006, 2017), with the ranks not being repeated. The lower the rank of an economy for a certain index, the better the level of the index is characteristic of this economy. In other words, Tables 01 to 02 list the economies in descending order for desirable characteristics: the best economy has the ordinal number 1 for GCI or EBF, while the worst economy has the ordinal number 116. Thus, the environment given in Tables 01 to 02 is characterized by expert information that can be presented as input data matrixes as follows: $\mathbf{R} = \mathbf{R}_{n\times k} = \left(r_{i\,j}\right)$, $n = 116$ (the number of economies), $k = 2$ (the number of indices).

Let us measure the statistical relationship between the two order variables (GCI and EBF) in 2006–2007 and 2017–2018 using a sample value of concordance coefficient. Since united ranks are absent in all orderings shown in Tables 01 to 02, a sample value of concordance coefficient (Aivazian & Mkhitarian, 1998) can be found by equation (1):

$$\hat{W}(k) = \frac{12}{k^2 \cdot \left(n^3 - n\right)} \cdot \sum_{j=1}^{n} \left( \sum_{i=1}^{k} r_{i\,j} - \frac{k \cdot (n+1)}{2} \right)^2, \quad (1)$$

where $k$ – the number of analyzed order variables (compared orderings); $n$ – the number of statistically examined objects or sample volume.

Concordance coefficient can possess a value between [0; 1]. The closer a sample value of concordance coefficient is to 1, the stronger rank correlation is characterized between the order variables.

In both analyzed environments (2006–2007 and 2017–2018) $k = 2$ (the number of indices), $n = 116$ (the number of economies).

For 2006–2007, the sample value of concordance coefficient, which is calculated by equation (1) based on Table 01 data, makes:

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$$\hat{W}_1(k) = \frac{12}{2^2 \cdot \left(116^3 - 116\right)} \cdot \sum_{j=1}^{116} \left( \sum_{i=1}^{2} r_{ij} - \frac{2 \cdot (116+1)}{2} \right)^2 =$$

$$= \frac{12}{6243120} \cdot \sum_{j=1}^{116} \left( \sum_{i=1}^{2} r_{ij} - 117 \right)^2 = \frac{12}{6243120} \cdot 474244 \approx 0.9116.$$

**Table 01.** Ranking 116 economies by their global competitiveness and the ethical behaviour of firms in 2006–2007 *

| Economy | GCI | EBF | Economy | GCI | EBF | Economy | GCI | EBF |
|---|---|---|---|---|---|---|---|---|
| Albania | 94 | 91 | Greece | 46 | 53 | Nicaragua | 92 | 73 |
| Algeria | 75 | 66 | Guatemala | 74 | 52 | Nigeria | 96 | 84 |
| Argentina | 68 | 98 | Honduras | 90 | 85 | Norway | 12 | 8 |
| Armenia | 80 | 96 | Hong Kong SAR | 11 | 17 | Pakistan | 88 | 80 |
| Australia | 19 | 9 | Hungary | 40 | 64 | Panama | 56 | 62 |
| Austria | 17 | 15 | Iceland | 14 | 11 | Paraguay | 101 | 114 |
| Azerbaijan | 63 | 63 | India | 42 | 44 | Peru | 73 | 55 |
| Bahrain | 48 | 40 | Indonesia | 49 | 95 | Philippines | 70 | 102 |
| Bangladesh | 95 | 115 | Ireland | 21 | 16 | Poland | 47 | 65 |
| Belgium | 20 | 22 | Israel | 15 | 25 | Portugal | 33 | 29 |
| Benin | 100 | 74 | Italy | 41 | 72 | Qatar | 37 | 30 |
| Bosnia and Herzegovina | 86 | 104 | Jamaica | 59 | 61 | Romania | 67 | 93 |
| Botswana | 79 | 39 | Japan | 7 | 19 | Russian Federation | 61 | 110 |
| Brazil | 65 | 71 | Jordan | 51 | 42 | Singapore | 5 | 6 |
| Bulgaria | 71 | 78 | Kazakhstan | 55 | 88 | Slovak Republic | 36 | 59 |
| Burundi | 116 | 89 | Kenya | 91 | 86 | Slovenia | 32 | 35 |
| Cambodia | 98 | 76 | Korea, Rep. | 24 | 37 | South Africa | 44 | 28 |
| Cameroon | 103 | 99 | Kuwait | 43 | 32 | Spain | 28 | 26 |
| Canada | 16 | 14 | Kyrgyz Republic | 102 | 116 | Sri Lanka | 78 | 92 |
| Chad | 115 | 113 | Latvia | 35 | 67 | Sweden | 3 | 4 |
| Chile | 27 | 18 | Lesotho | 106 | 94 | Switzerland | 1 | 10 |
| China | 53 | 100 | Lithuania | 39 | 50 | Taiwan, China | 13 | 34 |
| Colombia | 64 | 31 | Luxembourg | 22 | 13 | Tajikistan | 93 | 106 |
| Costa Rica | 52 | 38 | Madagascar | 104 | 82 | Tanzania | 99 | 83 |
| Croatia | 50 | 68 | Malawi | 110 | 70 | Thailand | 34 | 56 |
| Cyprus | 45 | 49 | Malaysia | 26 | 23 | Trinidad and Tobago | 66 | 81 |
| Czech Republic | 29 | 47 | Mali | 111 | 57 | Tunisia | 30 | 27 |
| Denmark | 4 | 2 | Malta | 38 | 45 | Turkey | 58 | 46 |
| Dominican Republic | 81 | 87 | Mauritania | 108 | 69 | Uganda | 107 | 97 |
| Ecuador | 87 | 75 | Mauritius | 54 | 54 | Ukraine | 77 | 112 |
| Egypt | 62 | 48 | Mexico | 57 | 41 | United Arab Emirates | 31 | 24 |
| El Salvador | 60 | 36 | Moldova | 84 | 105 | United Kingdom | 10 | 7 |
| Estonia | 25 | 43 | Mongolia | 89 | 108 | United States | 6 | 21 |
| Ethiopia | 113 | 103 | Morocco | 69 | 90 | Uruguay | 72 | 33 |
| Finland | 2 | 1 | Mozambique | 114 | 109 | Venezuela | 85 | 107 |
| France | 18 | 20 | Namibia | 82 | 51 | Vietnam | 76 | 79 |
| Gambia | 97 | 60 | Nepal | 105 | 111 | Zambia | 109 | 58 |
| Georgia | 83 | 101 | Netherlands | 9 | 12 | Zimbabwe | 112 | 77 |
| Germany | 8 | 5 | New Zealand | 23 | 3 | – | – | – |

* Formed by the authors based on (The Global Competitiveness Report 2006–2007, 2006)

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**Table 02.** Ranking 116 economies by their global competitiveness and the ethical behaviour of firms in 2017–2018 *

| Economy | GCI | EBF | Economy | GCI | EBF | Economy | GCI | EBF |
|---|---|---|---|---|---|---|---|---|
| Albania | 70 | 38 | Greece | 79 | 63 | Nicaragua | 85 | 94 |
| Algeria | 78 | 88 | Guatemala | 76 | 79 | Nigeria | 109 | 101 |
| Argentina | 84 | 111 | Honduras | 88 | 78 | Norway | 11 | 9 |
| Armenia | 68 | 47 | Hong Kong SAR | 6 | 15 | Pakistan | 101 | 66 |
| Australia | 21 | 11 | Hungary | 57 | 109 | Panama | 48 | 74 |
| Austria | 18 | 18 | Iceland | 28 | 20 | Paraguay | 98 | 114 |
| Azerbaijan | 34 | 32 | India | 39 | 31 | Peru | 67 | 103 |
| Bahrain | 43 | 23 | Indonesia | 35 | 37 | Philippines | 54 | 71 |
| Bangladesh | 90 | 90 | Ireland | 24 | 14 | Poland | 38 | 52 |
| Belgium | 20 | 21 | Israel | 16 | 26 | Portugal | 41 | 36 |
| Benin | 105 | 64 | Italy | 42 | 80 | Qatar | 25 | 17 |
| Bosnia and Herzegovina | 94 | 102 | Jamaica | 65 | 46 | Romania | 64 | 85 |
| Botswana | 59 | 40 | Japan | 9 | 12 | Russian Federation | 37 | 59 |
| Brazil | 73 | 108 | Jordan | 61 | 28 | Singapore | 3 | 3 |
| Bulgaria | 47 | 77 | Kazakhstan | 55 | 49 | Slovak Republic | 56 | 89 |
| Burundi | 111 | 104 | Kenya | 83 | 53 | Slovenia | 46 | 48 |
| Cambodia | 86 | 65 | Korea, Rep. | 26 | 76 | South Africa | 58 | 61 |
| Cameroon | 102 | 92 | Kuwait | 50 | 56 | Spain | 33 | 72 |
| Canada | 14 | 13 | Kyrgyz Republic | 93 | 81 | Sri Lanka | 77 | 57 |
| Chad | 115 | 113 | Latvia | 52 | 62 | Sweden | 7 | 7 |
| Chile | 32 | 34 | Lesotho | 112 | 86 | Switzerland | 1 | 4 |
| China | 27 | 44 | Lithuania | 40 | 43 | Taiwan, China | 15 | 29 |
| Colombia | 62 | 96 | Luxembourg | 19 | 10 | Tajikistan | 72 | 33 |
| Costa Rica | 45 | 41 | Madagascar | 106 | 97 | Tanzania | 99 | 69 |
| Croatia | 69 | 83 | Malawi | 113 | 91 | Thailand | 31 | 73 |
| Cyprus | 60 | 51 | Malaysia | 23 | 24 | Trinidad and Tobago | 75 | 100 |
| Czech Republic | 30 | 50 | Mali | 107 | 93 | Tunisia | 87 | 82 |
| Denmark | 12 | 5 | Malta | 36 | 42 | Turkey | 51 | 75 |
| Dominican Republic | 95 | 112 | Mauritania | 114 | 115 | Uganda | 100 | 70 |
| Ecuador | 89 | 107 | Mauritius | 44 | 35 | Ukraine | 74 | 87 |
| Egypt | 91 | 58 | Mexico | 49 | 99 | United Arab Emirates | 17 | 6 |
| El Salvador | 97 | 110 | Moldova | 81 | 95 | United Kingdom | 8 | 16 |
| Estonia | 29 | 27 | Mongolia | 92 | 105 | United States | 2 | 19 |
| Ethiopia | 96 | 54 | Morocco | 66 | 60 | Uruguay | 71 | 30 |
| Finland | 10 | 2 | Mozambique | 116 | 106 | Venezuela | 110 | 116 |
| France | 22 | 25 | Namibia | 82 | 39 | Vietnam | 53 | 68 |
| Gambia | 103 | 45 | Nepal | 80 | 84 | Zambia | 104 | 67 |
| Georgia | 63 | 55 | Netherlands | 4 | 8 | Zimbabwe | 108 | 98 |
| Germany | 5 | 22 | New Zealand | 13 | 1 | – | – | – |

* Formed by the authors based on (The Global Competitiveness Report, 2017)

For 2017–2018, the sample value of concordance coefficient, which is calculated by equation (1) based on Table 02 data, makes:

$$\hat{W}_2(k) = \frac{12}{2^2 \cdot \left(116^3 - 116\right)} \cdot \sum_{j=1}^{116} \left( \sum_{i=1}^{2} r_{ij} - \frac{2 \cdot (116+1)}{2} \right)^2 =$$

$$= \frac{12}{6243120} \cdot \sum_{j=1}^{116} \left( \sum_{i=1}^{2} r_{ij} - 117 \right)^2 = \frac{12}{6243120} \cdot 467548 \approx 0.8987.$$

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Let us estimate the statistical significance of the obtained sample values of concordance coefficient by Pearson's chi square test. For this purpose, let us calculate the actual values of the criterion by equation (2) and compare them with the critical value $\chi^2_{tabl.}(\alpha, n-1)$, where $\alpha = 0.05$, which is found using a special function of MS EXCEL.

$$\chi^2_{fact.} = k \cdot (n-1) \cdot \hat{W}(k), \tag{2}$$

where $\hat{W}(k)$ – sample value of concordance coefficient.

Table 03 gives the summary of the test results.

**Table 03.** The results of testing the statistical significance of the sample values of concordance coefficient

| Time period | $\hat{W}(k)$ | $\chi^2_{fact.}$ | $\chi^2_{tabl.}(0.05, 115)$ | Conclusion |
|---|---|---|---|---|
| 2006-2007 | $\hat{W}_1(k) \approx 0.9116$ | 209.66 | 141.03 | statistically significant |
| 2017-2018 | $\hat{W}_2(k) \approx 0.8987$ | 206.70 | 141.03 | statistically significant |

The analysis of Table 03 shows that we should trust the obtained concordance coefficients, since $\chi^2_{fact.} > \chi^2_{tabl.}$ for the two time periods and there is strong correlation dependence between the two order variables – The Global Competitiveness Index and Ethical behavior of firms in 2006–2007 and 2017-2018. In other words, at the given level of significance α, i.e., with the risk of error not more than in α · 100 % cases, the relationship between the analyzed order variables should be regarded as statistically significant.

## 7. Conclusion

In the time periods under study the obtained sample values of concordance coefficient are rather close to 1, which testifies to a strong correlation of ranks between the two variables of orders the ethical behaviour of firms and economies' competitiveness. The results of testing the obtained sample values of concordance coefficient for significance by Pearson's chi square test show that the relationship between the analyzed order variables is statistically significant. We can conclude that the ethical behaviour of firms has a significant impact on firms' competitiveness, as well as on economies' global competitiveness.

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