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## Concerning evaluation of ethics impact on national economy's competitiveness

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**Abstract:** This study aims to evaluate the impact of the ethical behaviour of firms on a national economy's competitiveness, based on data given in Global Competitiveness Reports. The firm is a complex open dynamic socio-economic system. Firms' sustainable development is impossible without a good reputation. In its decision making, the firm must comply with the code of ethics. The introduction of new technologies and innovations can result in extra risks and threats for the firm's external environment. Firms shall do no harm to their external environment. The firm's ethical behaviour contributes to preservation of its competitiveness and, accordingly, to its safety. The research paper constructs several models (linear equations) of dependence between the ethical behaviour of firms and the Global Competitiveness Index. We checked the constructed models for adequacy using an F-test. Our findings testify to a rather strong impact of the ethical behaviour of firms on national economies' competitiveness globally.

**Keywords:** firm; complex system; ethics; evaluation; corporate reputation; corporate safety; competitiveness; sustainable development; national economy; advanced technologies; risk; threat; decision making; firm's ethical behaviour; EBF; Global Competitiveness Index; GCI.

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## **1 Introduction**

Presently, firms perform in a highly dynamic external environment and face the necessity to constantly develop and introduce new technologies in the production of goods and services. New technologies (including digital ones) may be related to substantial risks and threats not only to the firm, but also to the firm's external environment.

According to the code of ethics, the firm shall do no harm to the health of consumers and staff and shall not damage the natural environment, etc. The firm's ethical behaviour will contribute to the preservation (enhancement) of its reputation and, accordingly, to the maintenance (improvement) of its competitiveness. That is why in their decision making the firm's managers shall comply with the code of ethics.

Firms are bricks which form the building of the national economy. Accordingly, the competitiveness of the national economy is in many respects defined by the competitiveness of national companies.

A great number of research papers are devoted to reputation aspects and challenges of corporate social responsibility. However, in these authors' opinion, the influence of the firm's ethical behaviour on the competitiveness of the national economy should be studied further.

## **2 The firm as a complex system**

The firm (enterprise) is the key player in a market economy. The competitiveness and performance of national business significantly influence the competitiveness of the national economy. "Each enterprise is an entire socio-economic world, which can be regarded as the homomorphic image of economy as a whole; no understanding of the enterprise's performance means no understanding of economic performance" (Kleiner, 2004).

Based on the aforesaid, it is no wonder that researchers display interest in the theory of the firm (enterprise). Presently, there are a great number of theories of the firm. Kleiner (2004) describes 18 basic theories of the firm, namely:

- 1 profit maximisation theory
- 2 entrepreneurial (Schumpeter's) theory
- 3 contract theory
- 4 theory of sales revenue maximisation
- 5 firm value maximisation theory
- 6 theory of the self-managed firm
- 7 cognitive theory
- 8 theory of firm's growth rate maximisation
- 9 behaviour theory
- 10 X-efficiency theory
- 11 theory of managerial utility maximisation
- 12 evolution theory
- 13 corporate culture theory
- 14 theory of managing doer's behaviour ('principal-agent')
- 15 political theory (theory of power)
- 16 theory of positioning (in the branch, in the region, in the administrative environment)
- 17 property rights theory
- 18 information theory.

Table 1 systematises the above theories of the firm (Kleiner, 2004).

Kleiner (2004) pays attention to inconsistency of these theories of the firm given in Table 1, as neither of them regards the firm as a complex system. To solve this challenge, he (Kleiner, 2003, 2004, 2008) designs a new system-integration theory of the firm.

Kleiner (2003) gives a system description of the firm and singles out its subsystems as follows: asset complex, organisational and technological subsystem, social subsystem (staff, management, etc.), institutional subsystem and cultural environment; he claims that "... irrespective of size, each firm is a scene of interactions among politics, economy, culture, ideology, etc.; so analysis within one discipline can produce just partial results".

The system-integration theory describes the firm as a systems integrator of production resources, intentions, expectations and interests of internal and external stakeholders of the firm (Kleiner, 2008). In his theory, Kleiner also introduces the notion of system event "... as a brief significant change affecting various fields and subsystems of the firm" (Kleiner, 2003), a fact of "...vital importance for the firm's perception by all parties concerned with its performance" (Kleiner, 2003). Events in the firm's life can become a factor of staff consolidation, disintegration, a core factor, a motivating tool, a source of competitive advantages, etc. (Kleiner, 2003).

**Table 1** Theories of the firm systematised according to Kleiner (2004)

##	Groups of theories of the firm	Brief description	Variants of theories of the firm
1	Goal theories	These theories agree that the firm has a permanent goal which influences the firm's decisions and their implementation.	<ul style="list-style-type: none"> <li>• profit maximisation theory</li> <li>• theory of sales revenue maximisation</li> <li>• firm value maximisation theory</li> <li>• theory of firm's growth rate maximisation.</li> </ul>
2	Theories of position	The group unites theories, where the firm's behaviour and state are considered as results of its position in this or that population.	<ul style="list-style-type: none"> <li>• evolution theory</li> <li>• theory of positioning.</li> </ul>
3	Social theories	The theories appeal to interests, psychology and behaviour of these or those individuals or groups within or near the firm.	<ul style="list-style-type: none"> <li>• entrepreneurial theory</li> <li>• theory of the self-managed firm</li> <li>• behaviour theory</li> <li>• X-efficiency theory</li> <li>• theory of managerial utility maximisation</li> <li>• political theory.</li> </ul>
4	Environmental theories (including institutional ones)	The group focuses on the role of these or those environments, both filling the inner space of the firm and stretching outside its borders (in their turn, institutional theories acknowledge these or those institutions as a driving force of agents' behaviour).	<ul style="list-style-type: none"> <li>• cognitive theory</li> <li>• corporate culture theory</li> <li>• information theory</li> <li>• contract theory</li> <li>• theory of managing doer's behaviour</li> <li>• property rights theory.</li> </ul>

*Source:* Formed by the authors based on Kleiner (2004)

The key objective of the firm's performance is certainly one of the most significant issues in economic science. Historically, the paradigm of market economy has been "the pursuit of profits" (Gataullin and Malykhin, 2010). Thus, according to Friedman: "There is one and only one social responsibility of business – to use its resources and engage in activities to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition, without deception or fraud" (Ebner and Baumgartner, 2006). However, modern economic science increasingly advances an opinion that the key objective of management is the firm's sustainable development (Kucherova, 2007). In other words, the firm's sustainable development is the key objective, on which the efforts of management and staff shall be focused.

The paradigm of sustainable development was created in 1975 based on the Worldwatch Institute (Gataullin and Malykhin, 2010). The idea was originally designed for macroeconomics. Thus, the United Nations Organization's 1987 report 'Our Common

Future' defines *sustainable development* as "development that meets the needs of current generations without compromising the ability of future generations to meet their needs and aspirations" (Reinhard et al., 2005).

Afterwards, the idea of sustainable development was extended to microeconomics – the level of the enterprise (Reinhard et al., 2005). So far there is no generally accepted definition of *sustainable development of the firm* (also the term of *corporate sustainability* is used). Let us examine some definitions of the notion given in scientific literature:

"*Sustainable development* is the process of changes, where the exploitation of resources, investment patterns, research and technology advancement and institutional changes agree with each other and strengthen the current and future potential of the firm." (Shershniova, 1999)

"... *corporate sustainability* can accordingly be defined as meeting the needs of a firm's direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities etc.), without compromising its ability to meet the needs of future stakeholders as well." (Dyllick and Hockerts, 2002)

"*Sustainable development* is a complex concept, encompassing economic, environmental and social factors that affect the ability of an organisation to survive and grow." (Beloff et al., 2004)

"*Sustainable development of the firm* as a complex economic system means that, in altering external and internal environment, it is able to preserve such a state, which in case of positive trend of acquisition of essential entrepreneurial income provides for retention and expansion of the share of the target market in the long-term." (Tsareva, 2006)

"... *sustainable development of the firm* is a balanced progressive change in all indices of sustainability of the firm able to resist entropic trends and, at the same time, keep integrity and basic properties." (Kucherova, 2007)

"The role of *sustainable development of the firm* consists in a goal-oriented change of the internal environment taking into account future alteration of the external environment with simultaneous provision of the firm with complex sustainability, which is the system of the current and long-term sustainability." (Alekseenko, 2008)

"*Sustainable development of the firm* is such a development which not only meets requirements of the firm's owners (stockholders) to get a profit in the short-term, but also contributes to preservation (increase) of the firm's competitiveness in the market in the medium- and long-term." (Bakumenko, 2011)

"... *sustainable development ... of the firm* constitutes an advanced tendency and is secured by transformations related to changes in their structure and functions with the purpose of self-preservation and self-reproduction as an entire system in response to challenges of socio-economic environment." (Bazarova, 2014)

Analysis of the above definitions of 'sustainable development of the firm' allows us to say that the firm has to preserve itself as an integral relatively autonomous system in the long-term. The survival of the firm in constantly evolving external environment is impossible without preservation of its competitiveness in the short-, medium- and long-term.

Reinhard et al. (2005) single out four aspects of sustainable development for microeconomics:

- 1 *economic aspect* (financial performance of the firm; its long-term competitiveness, the firm's economic influence on stakeholders)
- 2 *social aspect* (justice within the firm; international justice; internal and external social improvements)
- 3 *environmental aspect* (use of resources; emissions; environmental damage and risks)
- 4 *secondary aspects* (transparency and involvement; integration).

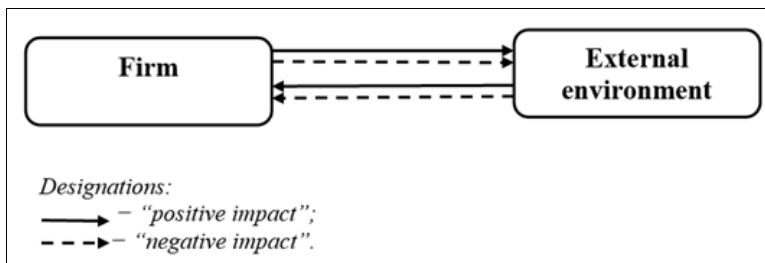
The firm is a complex open dynamic socio-economic system, which consists of a great number of interconnected and interacting elements. The firm constantly interacts with the external environment. According to Kleiner (2004), the external environment includes not only stakeholders, but also other groups of social and economic subjects as well as certain environments (for instance, natural environment).

Bakumenko and Sigal (2018) notes that “the external environment can be regarded as a set of corporate threats and opportunities. Corporate managers should resist threats and enhance corporate security”. In modern business practice, we can observe the elimination of distinctions between internal and external aspects, which constitutes the most essential challenge solved by enterprises (Hatch and Schultz, 1997).

Bakumenko and Sigal (2018) gives a corporate development scheme, which shows “that the current state of corporate subsystems in many ways results from past decision making while future performance depends on present decision making”. The dynamic nature of the external environment demands constant actions and development from the firm. In other words, to remain a comprehensive relatively autonomous system, the firm shall constantly make sound and timely decisions and implement them.

The external environment can have a positive and negative impact on the firm. In its turn, the firm can influence the external environment both positively and negatively, as displayed by Figure 1.

**Figure 1** Mutual influence of the firm and the external environment



In its everyday performance and decision making, the firm must comply with the code of ethics. Decisions going against social and ethical standards are not to be made and implemented. The above constitutes the essence of the ethical principle. It is essential to formulate the ethical principle, since law compliance does not guarantee that the implementation of a decision will not negatively impact the natural environment, the health of consumers and staff, the country's population, etc. Moreover, the necessity also arises from the fact that as a rule the developer of a new product (service) is better informed about its qualities (including negative ones) than anybody else.

The level of ethics during decision making will definitely influence the firm's reputation, if not instantly, then for sure in the long-term. It is common knowledge that reputation is one of the most important assets of the firm and greatly influences the firm's competitiveness. The firm's sustainable development is impossible without a good reputation.

### **3 Firm's operation, ethical behaviour of firms and safety issues in terms of advanced technologies development**

Presently, business performs in a highly dynamic environment under constantly growing global competitiveness. From year to year, new technologies are more and more rapidly developed and applied to produce goods and services. The development of state-of-the-art technologies (including digital ones) has not lowered risks of business activities and threats for the firm. On the contrary, business risks have even increased.

There are instances where the introduction of new technologies and innovations can result in extra risks and threats for the firm's external environment as well. That is why such projects and innovations shall be thoroughly studied at the pre-investment stage of the project's lifecycle. They shall do no harm to the health of consumers and staff; they should not damage the natural environment, etc.

Modern economics has introduced the terms of 'ethical investment' and 'socially responsible investing'. The research paper (McKenna, 2017) notes that year by year investors are more and more interested in ethical aspects of investing and the concept of corporate social responsibility. However, there are different approaches to the essence of the term of 'socially responsible investing'. Some investors regard as socially responsible such investment which "avoids supporting tobacco companies or weapons manufacturers" (McKenna, 2017), i.e., investment not connected with unethical objectives. Other investors have a deeper view of the issue and consider 'socially responsible investing' in respect to three criteria as follows: environmental, social and governance ones (McKenna, 2017).

Bakumenko and Sigal (2018) shows that a decrease in corporate reputation, which resulted from the implementation of an investment project, constitutes a substantial threat for the firm's safety. So, investment decision making should take into account reputation aspects. An additional threat for the firm's safety is a decrease in corporate reputation due to other (non-investment) initiatives and activities. "Corporate reputation cannot be totally controlled and depends on corporations' actions, which makes ethics essential" (Bakumenko and Sigal, 2018). That is why ethical aspects are to be taken into consideration by managers in their decision making.

Also, in their decision making, the firm's managers should realise that the development of modern computer techniques and communication technologies has led to a high speed of information distribution. Year after year, the firm's performance is getting more and more visible for the community. In case the firm acts against ethics and harms a subject of the external environment, most probably, the information will be very soon known by many persons concerned, with a negative impact on corporate reputation and a threat to the firm's safety. The firm has to remain an integral relatively autonomous system and ensure its safety.

Korolev (2012) regards threat as "a probable negative impact on the firm, focused in space and concentrated in time, able to cause an unacceptable damage". Researchers

single out the following sources of safety threats: – contradictions between elements of the firm as a system; – contradictions between the firm and its external environment (Korolev, 2012).

All present corporate threats form two groups: external and internal ones. External threats originate outside the firm in the external environment. They are (Lyashko, 2014): – informational threats; – brand threats; – environmental threats, etc. Internal threats are (Lyashko, 2014): – loss or leak of information (for instance, commercial secrets); – reputation decrease as perceived by business partners; – acting of employees against corporate interests, etc.

The notion of ‘safety of the firm’ has several interpretations: “a result of active actions to discover and avert threats; a result of absence of or minimal level of threats; a result of absence of or minimal volume of the firm’s performance” (Korolev, 2012).

Each firm aims at minimisation of probable threats, their timely exposure and prevention. And, of course, the firm should not create threats by going against ethics. The firm’s ethical behaviour contributes to preservation of its competitiveness and, accordingly, to its safety.

It is interesting to analyse how the level of ethical behaviour of firms (EBF) influences the country’s competitiveness. The analysis is given below.

#### **4 Ethical behaviour of business and national economy’s competitiveness**

As has been said above, the firm is the key player in market economy, with business operations shaping national economy’s opportunities for higher competitiveness. At the same time, a country’s competitiveness defines the opportunities of domestic business to grow.

To analyse the impact of EBF on national economy’s competitiveness, we have studied data given in 2006–2018 Global Competitiveness Reports of the World Economic Forum (WEF), available on WEF official website.

These reports regard competitiveness as “the set of institutions, policies, and factors that determine the level of productivity of a country” (World Economic Forum, 2013).

The basic index used by WEF to evaluate national economies’ competitiveness is called the Global Competitiveness Index (*GCI*). *GCI* is a complex index based on over 100 indices (World Economic Forum, 2014). To form *GCI*, WEF uses data coming from two main sources:

- 1 international agencies and domestic sources
- 2 surveys of companies’ top management (World Economic Forum, 2014).

*GCI* gives an advantage of contrastive analysis (both in terms of time and countries) as it is annually calculated for the majority of national economies. Thus, for instance, WEF’s 2017–2018 Global Competitiveness Report covers 137 national economies (World Economic Forum, 2018).

Indices used to calculate *GCI* are divided into 12 pillars:

- 1 institutions
- 2 infrastructure
- 3 macroeconomic environment



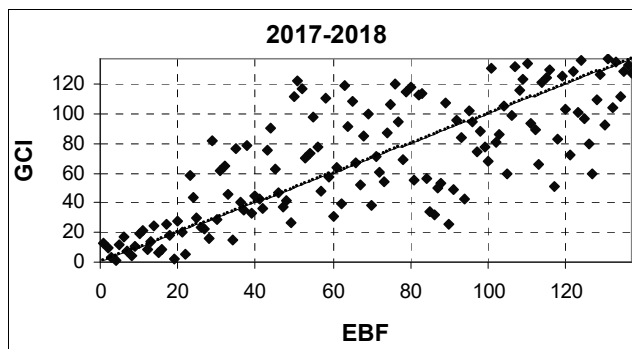
- 4 health and primary education
- 5 higher education and training
- 6 goods market efficiency
- 7 labour market efficiency
- 8 financial market sophistication
- 9 technological readiness
- 10 market size
- 11 business sophistication
- 12 innovation (World Economic Forum, 2018).

The GCI ranges from 0 to 7; the higher figure, the higher competitiveness of a national economy.

A host of interrelated factors shape national economy's competitiveness. However, this study aims to evaluate only the impact of ethical aspects on national economy's competitiveness.

One of a great number of *GCI* components is the '*EBF*'. This criterion belongs to the first *GCI* pillar called 'institutions' and is measured by the scores from 0 to 7. The higher figure, the higher level of ethics is characteristic of business in a country.

**Figure 2** Correlation between EBF and GCI in 2017–2018

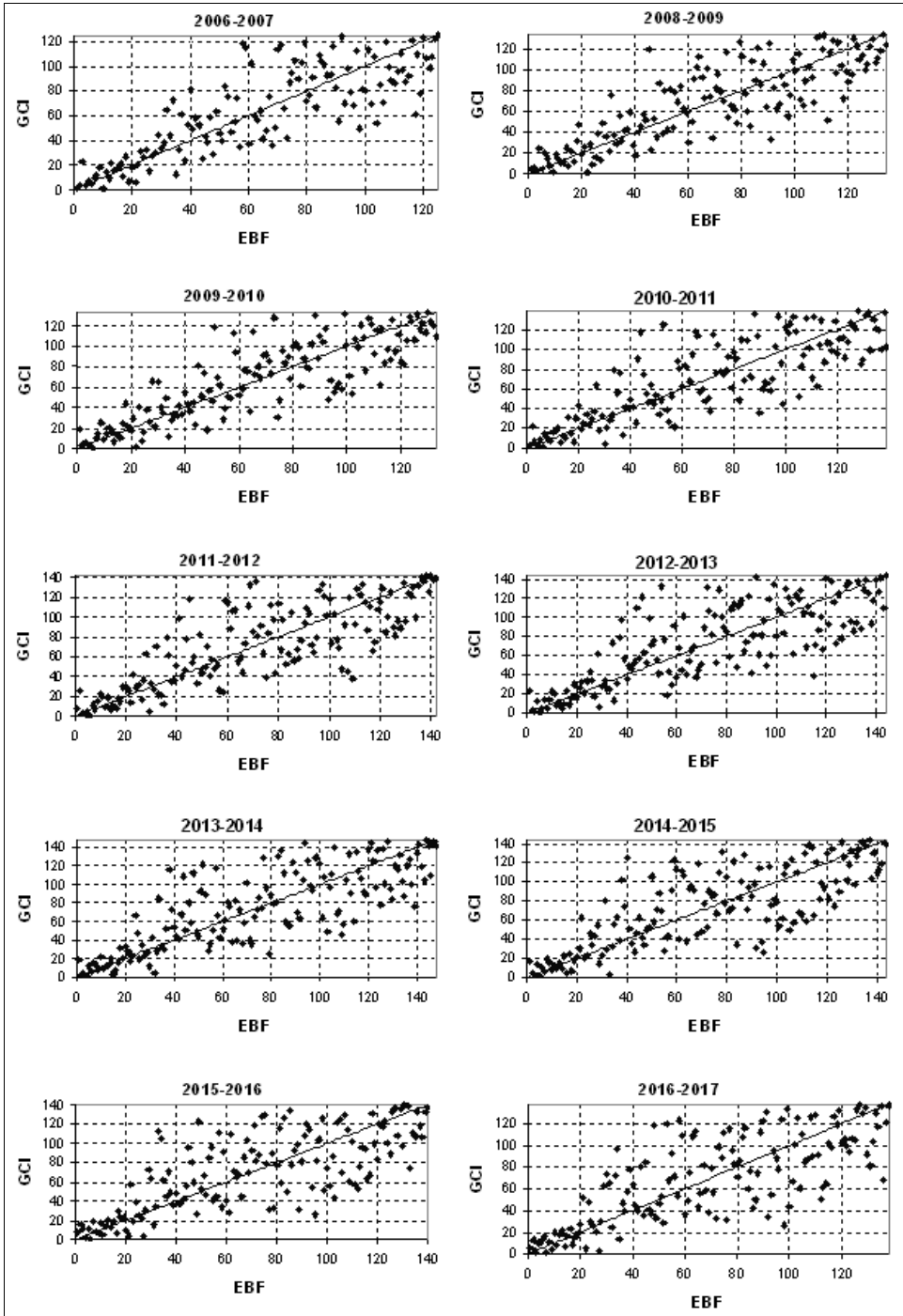


*Source:* Graphed by the authors based on World Economic Forum (2018)

Figure 2 shows dependence between the place of a national economy in the EBF (abscissa,  $x$ ) and the GCI (ordinate axis,  $y$ ) for 137 national economies in 2017–2018. The first place in a rating (by a certain index) is taken by a national economy with the best value of the given index, while a country with the worst value of the given index takes the last place. Figure 2 shows that the cloud is mainly sufficiently close to the straight line  $y = x$ , while some points directly lie on the straight line.

It should be noted that the above is characteristic not only of 2017–2018. Figure 3 gives similar point charts for the previous ten periods. The clouds in all analysed time slices are mainly sufficiently close to the straight line  $y = x$ , while all ten point charts are analogous with each other.

Figure 3 Correlation between EBF rank and GCI rank in 2006–2017



Source: Graphed by the authors based on World Economic Forum (2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017)

Importantly, in 2017–2018, 16 out of 20 countries with the highest *EBF* rank are among the top 20 in the *GCI*, while nine out of 20 countries with the lowest *EBF* rank are among the last 20. Table 2 shows similar insights for the ten previous periods.

**Table 2** The number of national economies that simultaneously joined the top (last) 20 in terms of *GCI* score and the top (last) 20 in terms of *EBF* score in 2006–2018

<i>National economy's development level</i>	<i>Period</i>										
	2006–2007	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Top 20 in terms of <i>GCI</i> and <i>EBF</i>	16	15	15	16	16	15	17	17	16	17	16
Last 20 in terms of <i>GCI</i> and <i>EBF</i>	9	8	9	10	12	11	7	12	10	9	9

*Source:* Formed by the authors based on World Economic Forum (2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018)

To determine the closeness and nature of interrelation between national economies' *EBF* and *GCI* ranks, we have designed respective correlation coefficients given in Table 3. Table 3 shows that in 2006–2018 the lowest correlation coefficient between *EBF* (rank) and *GCI* (rank) equals 0.74 and corresponds to 2015–2016, while the highest one makes up 0.84 and covers 2009–2010.

**Table 3** Correlation coefficients between national economies' *EBF* and *GCI* ranks in 2006–2018

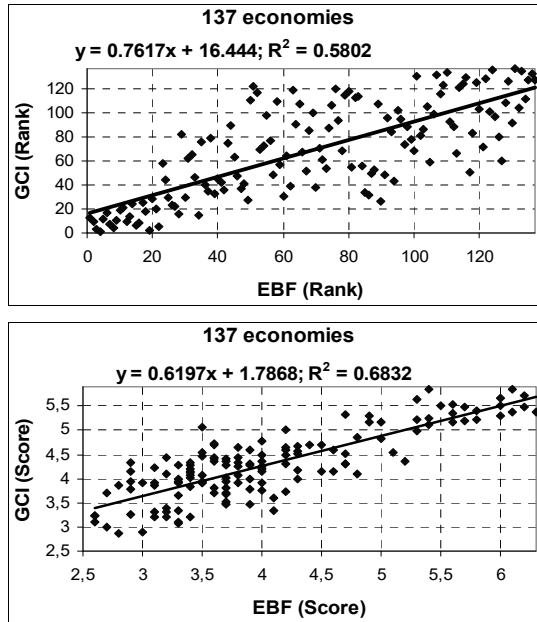
<i>Period</i>	2006–2007	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018
Number of national economies under study	125	134	133	139	142	144	148	144	140	138	137
Correlation coefficient	0.83	0.83	0.84	0.82	0.81	0.79	0.79	0.78	0.74	0.76	0.76

*Source:* Formed by the authors based on World Economic Forum (2007, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018)

We have set up linear equations of dependence between national economies' *EBF* and *GCI* ranks and scores in 2017–2018 for three cases below:

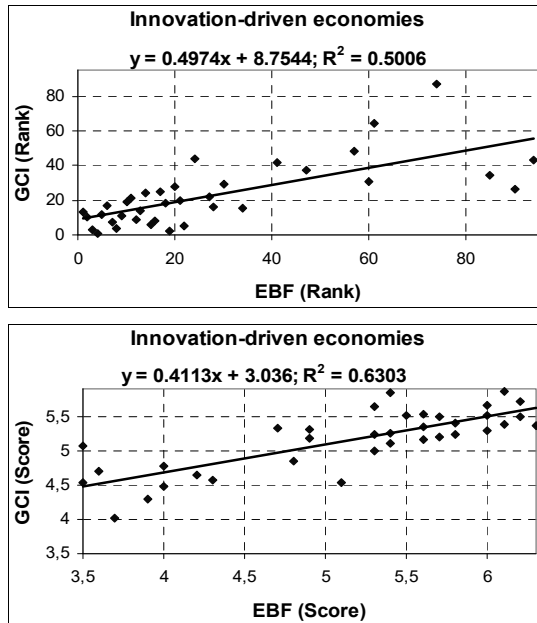
- 1 taking into consideration all 137 national economies represented in 2017–2018 Global Competitiveness Report (see Figure 4)
- 2 examining 36 innovation-driven national economies (see Figure 5, Table 4)
- 3 studying 36 advanced national economies (see Figure 6, Table 4).

**Figure 4** Linear equation of dependence between *EBF* and *GCI* ranks and scores for 137 national economies in 2017–2018



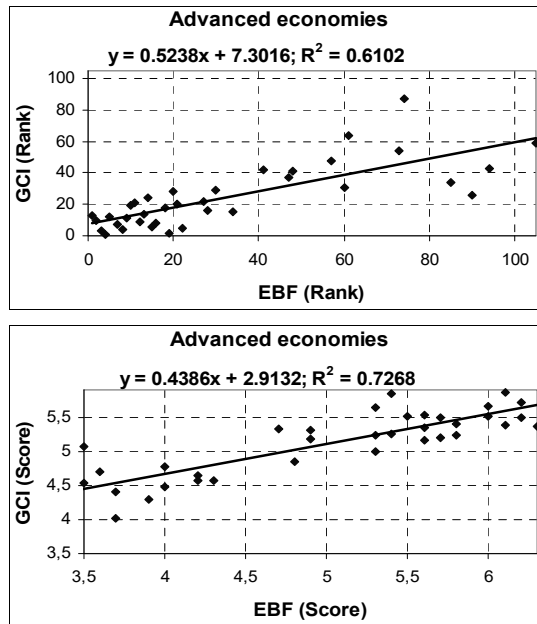
Source: Graphed by the authors based on World Economic Forum (2018)

**Figure 5** Linear equation of dependence between *EBF* and *GCI* ranks and scores for 36 innovation-driven economies in 2017–2018



Source: Graphed by the authors based on World Economic Forum (2018)

**Figure 6** Linear equation of dependence between *EBF* and *GCI* ranks and scores for 36 advanced national economies in 2017–2018



Source: Graphed by the authors based on World Economic Forum (2018)

Based on 2017–2018 Global Competitiveness Report, a linear equation of dependence between the EBF and the GCI for all countries covered by the report is given below:

$$GCI(Rank) = 0.7617 \cdot EBF(Rank) + 16.444, \tag{1}$$

where

*GCI(Rank)* a national economy’s place in the GCI

*EBF(Rank)* a national economy’s place in the EBF.

Similarly, we have set up an equation (2) that reflects linear correlation between scores of the corresponding indices for 137 national economies in 2017–2018:

$$GCI(Score) = 0.6197 \cdot EBF(Score) + 1.7868, \tag{2}$$

where

*GCI(Score)* value of the GCI

*EBF(Score)* value of the EBF.

**Table 4** List of innovation-driven and advanced national economies and their *GCI* ranks in 2017–2018

<i>GCI</i> (rank)	Economy	Stage*	<i>GCI</i> (rank)	Economy	Stage*	<i>GCI</i> (rank)	Economy	Stage*
1	Switzerland	I, A	14	Canada	I, A	29	Estonia	I, A
2	United States	I, A	15	Taiwan, China	I, A	31	Czech Republic	I, A
3	Singapore	I, A	16	Israel	I, A	34	Spain	I, A
4	Netherlands	I, A	17	United Arab Emirates	I	37	Malta	I, A
5	Germany	I, A	18	Austria	I, A	41	Lithuania	A
6	Hong Kong SAR	I, A	19	Luxembourg	I, A	42	Portugal	I, A
7	Sweden	I, A	20	Belgium	I, A	43	Italy	I, A
8	United Kingdom	I, A	21	Australia	I, A	44	Bahrain	I
9	Japan	I, A	22	France	I, A	48	Slovenia	I, A
10	Finland	I, A	24	Ireland	I, A	54	Latvia	A
11	Norway	I, A	25	Qatar	I	59	Slovak Republic	A
12	Denmark	I, A	26	Korea, Rep.	I, A	64	Cyprus	I, A
13	New Zealand	I, A	28	Iceland	I, A	87	Greece	I, A

Notes: \* – Stage of development: I – innovation-driven economy; A – advanced economy.

Source: Formed by the authors based on World Economic Forum (2018)

As  $R^2$  coefficient is rather low for the equations (1) and (2) (equalling 0.58 and 0.68, respectively), we cannot claim the given equations to describe interrelation under study to the full extent. However, these equations provide analysts with important economic data. Taking into consideration received interrelations, we can say that in 2017–2018 on average:

- a national economy's shifting one position upwards or downwards in the 'EBF' rating triggered a respective climb or fall in the place in the GCI by 0.7617
- an increase (decrease) in *EBF* score by 1 was accompanied by a respective increase (decrease) in *GCI* score by 0.6197.

Advanced and innovation-driven national economies are of special interest.

WEF divides national economies into three basic groups, depending on development level:

- 1 the first stage of development is a factor-driven economic system, with a competitive advantage of 'factor gifts' (availability of low-skilled labour force and natural resources; companies compete in price and sell elementary goods or raw materials, and are characterised by poor performance and, correspondingly, low salaries).
- 2 the second stage of development is an efficiency-driven economic system, which differs from the first stage due to a better performance and higher salaries as well as by rapid growth; companies are forced to design more efficient manufacturing processes and enhance the quality of goods.
- 3 the third stage of development is an innovation-driven economic system, where companies compete in design and production of new / unique goods, with the use of advanced technologies and / or state-of-the-art manufacturing processes or business models (World Economic Forum, 2013).

According to 2017–2018 Global Competitiveness Report, 36 countries belong to innovation-driven economic systems (see Table 4). These economic systems are characterised by the following basic features:

- GDP per capita thresholds 17 000 USD (annually)
- contribution of basic requirements to GCI makes up 20%
- contribution of efficiency enhancers to GCI equals 50%
- contribution of innovation and sophistication to GCI constitutes 30% (World Economic Forum, 2018).

For innovation-driven national economies, corresponding linear equations of dependence, set up on the basis of 2017–2018 Global Competitiveness Report, are given below, see formulas (3) to (4), Figure 5:

$$GCI(Rank) = 0.4974 \cdot EBF(Rank) + 8.7544, \quad (3)$$

$$GCI(Score) = 0.4113 \cdot EBF(Score) + 3.036. \quad (4)$$

Thus, in 2017–2018, innovation-driven national economies are on average characterised by:

- a national economy's shifting one position upwards or downwards the EBF rating triggered off a respective climb or fall in the place in the GCI by 0.4974
- an increase (decrease) in *EBF* score by 1 was accompanied by a respective increase (decrease) in *GCI* score by 0.4113.

According to 2015–2016 Global Competitiveness Report (World Economic Forum, 2016), 36 countries belong to advanced market economies (see Table 4). Importantly, 2017–2018 Global Competitiveness Report regards the majority of these countries (91.7%) as innovation-driven economies, except for Lithuania, Latvia and Slovak Republic.

Figure 6 shows linear equations of dependence between *EBF* and *GCI* ranks and scores for 36 advanced national economies in 2017–2018 as well as respective  $R^2$  coefficients. The given equations of dependence slightly differ from the formulas (3) to (4).

We believe that these findings testify to a rather strong impact of the EBF on national economies' competitiveness globally. Also, it is possible to assume that the index under study has a similar influence on a company (firm), as competitive economy is impossible without competitive enterprises.

## 5 Change in EBF

It is interesting to know how the EBF has changed globally in 2017–2018 as compared with 2006–2007. Thereto we have designed Table 5, with scores of the *GCI* and the *EBF* for 116 national economies in 2006–2007 and 2017–2018. Table 5 covers only 116 national economies as such a number is given in both reports: The Global Competitiveness Report 2006–2007 and The Global Competitiveness Report 2017–2018 (World Economic Forum, 2007, 2018).

Based on Table 5, we have calculated an average of the EBF against national economies' competitiveness levels in 2006–2007 and 2017–2018 (see Table 6). One may note that in 2017–2018:

- twenty-seven national economies, with *GCI* score from 5.00 to 5.99 inclusive, have an average of 5.49 of *EBF*
- fifty-three national economies, with *GCI* score from 4.00 to 4.99 inclusive, have an average of 3.88 of *EBF*
- thirty-four national economies, with *GCI* score from 3.00 to 3.99 inclusive, have an average of 3.36 of *EBF*
- two national economies, whose *GCI* score does not exceed 2.99, have an average of 2.85 of *EBF*.

The above shows that higher averages of *EBF* are characteristic of countries with higher *GCI*. The trend is clearly visible in Table 6 for similar data of 2006–2007.



**Table 5** Scores of GCI and *EBF* for 116 national economies in 2006–2007 and 2017–2018

#	Economy	2006–2007		2017–2018		#	Economy	2006–2007		2017–2018	
		GCI score	EBF score	GCI score	EBF score			GCI score	EBF score	GCI score	EBF score
1	Albania	3.46	3.7	4.18	4.3	30	Ecuador	3.67	3.9	3.91	3.0
2	Algeria	3.90	4.1	4.07	3.4	31	Egypt	4.07	4.4	3.90	3.8
3	Argentina	4.01	3.5	3.95	2.9	32	El Salvador	4.09	4.6	3.77	2.9
4	Armenia	3.75	3.5	4.19	4.0	33	Estonia	5.12	4.5	4.85	4.8
5	Australia	5.29	6.1	5.19	5.7	34	Ethiopia	2.99	3.4	3.78	3.9
6	Austria	5.32	5.9	5.25	5.4	35	Finland	5.76	6.7	5.49	6.2
7	Azerbaijan	4.06	4.1	4.69	4.5	36	France	5.31	5.6	5.18	4.9
8	Bahrain	4.28	4.6	4.54	5.1	37	Gambia	3.43	4.2	3.61	4.1
9	Bangladesh	3.46	2.9	3.91	3.3	38	Georgia	3.73	3.5	4.28	3.9
10	Belgium	5.27	5.4	5.23	5.3	39	Germany	5.58	6.3	5.65	5.3
11	Benin	3.37	3.9	3.47	3.7	40	Greece	4.33	4.3	4.02	3.7
12	Bosnia and Herzegovina	3.67	3.4	3.87	3.1	41	Guatemala	3.91	4.3	4.08	3.5
13	Botswana	3.79	4.6	4.30	4.2	42	Honduras	3.58	3.8	3.92	3.5
14	Brazil	4.03	4.0	4.14	2.9	43	Hong Kong SAR	5.46	5.7	5.53	5.6
15	Bulgaria	3.96	3.9	4.46	3.5	44	Hungary	4.52	4.1	4.33	2.9
16	Burundi	2.59	3.7	3.21	3.1	45	Iceland	5.40	6.0	4.99	5.3
17	Cambodia	3.39	3.9	3.93	3.7	46	India	4.44	4.5	4.59	4.6
18	Cameroon	3.30	3.5	3.65	3.3	47	Indonesia	4.26	3.6	4.68	4.3
19	Canada	5.37	5.9	5.35	5.6	48	Ireland	5.21	5.7	5.16	5.6
20	Chad	2.61	3.1	2.99	2.7	49	Israel	5.38	5.1	5.31	4.9
21	Chile	4.85	5.6	4.71	4.4	50	Italy	4.46	3.9	4.54	3.5
22	China	4.24	3.5	5.00	4.2	51	Jamaica	4.10	4.1	4.25	4.0
23	Colombia	4.04	4.8	4.29	3.3	52	Japan	5.60	5.6	5.49	5.7
24	Costa Rica	4.25	4.6	4.50	4.2	53	Jordan	4.25	4.5	4.30	4.7
25	Croatia	4.26	4.0	4.19	3.4	54	Kazakhstan	4.19	3.8	4.35	4.0
26	Cyprus	4.36	4.4	4.30	3.9	55	Kenya	3.57	3.8	3.98	3.9
27	Czech Republic	4.74	4.4	4.77	4.0	56	Korea, Rep.	5.13	4.6	5.07	3.5
28	Denmark	5.70	6.6	5.39	6.1	57	Kuwait	4.41	4.8	4.43	3.8
29	Dominican Republic	3.75	3.8	3.87	2.8	58	Kyrgyz Republic	3.31	2.9	3.90	3.5

Source: Formed by the authors based on World Economic Forum (2007, 2018)

**Table 5** Scores of GCI and *EBF* for 116 national economies in 2006–2007 and 2017–2018 (continued)

#	Economy	2006–2007			2017–2018			#	2006–2007			2017–2018		
		GCI score	EBF score	Economy score	GCI score	EBF score	Economy score		GCI score	EBF score	Economy score	GCI score	EBF score	Economy score
59	Latvia	4.57	4.0		4.40	3.7		88	4.60	4.9	Portugal	4.57	4.3	
60	Lesotho	3.22	3.7		3.20	3.4		89	4.55	4.8	Qatar	5.11	5.4	
61	Lithuania	4.53	4.3		4.58	4.2		90	4.02	3.7	Romania	4.28	3.4	
62	Luxembourg	5.16	6.0		5.23	5.8		91	4.08	3.2	Russian Federation	4.64	3.8	
63	Madagascar	3.27	3.8		3.40	3.2		92	5.63	6.2	Singapore	5.71	6.2	
64	Malawi	3.07	4.0		3.11	3.3		93	4.55	4.2	Slovak Republic	4.33	3.4	
65	Malaysia	5.11	5.1		5.17	5.0		94	4.64	4.6	Slovenia	4.48	4.0	
66	Mali	3.02	4.2		3.33	3.3		95	4.36	4.9	South Africa	4.32	3.8	
67	Malta	4.54	4.5		4.65	4.2		96	4.77	5.0	Spain	4.70	3.6	
68	Mauritania	3.17	4.0		3.09	2.6		97	3.87	3.7	Sri Lanka	4.08	3.8	
69	Mauritius	4.20	4.3		4.52	4.3		98	5.74	6.4	Sweden	5.52	6.0	
70	Mexico	4.18	4.6		4.44	3.2		99	5.81	6.1	Switzerland	5.86	6.1	
71	Moldova	3.71	3.4		3.99	3.3		100	5.41	4.7	Taiwan, China	5.33	4.7	
72	Mongolia	3.60	3.2		3.90	3.1		101	3.50	3.4	Tajikistan	4.14	4.5	
73	Morocco	4.01	3.7		4.24	3.8		102	3.39	3.8	Tanzania	3.71	3.7	
74	Mozambique	2.94	3.2		2.89	3.0		103	4.58	4.2	Thailand	4.72	3.6	
75	Namibia	3.74	4.3		3.99	4.3		104	4.03	3.8	Trinidad and Tobago	4.09	3.2	
76	Nepal	3.26	3.1		4.02	3.4		105	4.71	5.0	Tunisia	3.93	3.5	
77	Netherlands	5.56	6.0		5.66	6.0		106	4.14	4.4	Turkey	4.42	3.6	
78	New Zealand	5.15	6.4		5.37	6.3		107	3.19	3.5	Uganda	3.70	3.6	
79	Nicaragua	3.52	3.9		3.95	3.3		108	3.89	3.1	Ukraine	4.11	3.4	
80	Nigeria	3.45	3.8		3.30	3.1		109	4.66	5.1	United Arab Emirates	5.30	6.0	
81	Norway	5.42	6.1		5.40	5.8		110	5.54	6.2	United Kingdom	5.51	5.5	
82	Pakistan	3.66	3.8		3.67	3.7		111	5.61	5.5	United States	5.85	5.4	
83	Panama	4.18	4.1		4.44	3.6		112	3.96	4.7	Uruguay	4.15	4.6	
84	Paraguay	3.33	3.0		3.71	2.7		113	3.69	3.3	Venezuela	3.23	2.6	
85	Peru	3.94	4.3		4.22	3.1		114	3.89	3.9	Vietnam	4.36	3.7	
86	Philippines	4.00	3.5		4.35	3.6		115	3.16	4.2	Zambia	3.52	3.7	
87	Poland	4.30	4.1		4.59	3.9		116	3.01	3.9	Zimbabwe	3.32	3.2	

Source: Formed by the authors based on World Economic Forum (2007, 2018)

**Table 6** Averages of *EBF* for 116 national economies versus *GCI* in 2006–2007 and 2017–2018

<i>Indices</i>		<i>GCI (score)</i>				
		<i>From 5.00 to 5.99</i>	<i>From 4.00 to 4.99</i>	<i>From 3.00 to 3.99</i>	<i>From 2.5 to 2.99</i>	<i>All economies</i>
2017 to 2018	Number of national economies	27	53	34	2	116
	Averages of <i>EBF</i>	5.49	3.88	3.36	2.85	4.08
2006 to 2007	Number of national economies	26	44	42	4	116
	Averages of <i>EBF</i>	5.78	4.30	3.75	3.35	4.40

*Source:* Calculated by the authors based on World Economic Forum (2007, 2018)

Also, Table 6 reveals that, in 2017–2018 as against 2006–2007, 116 national economies under study face lower averages of the *EBF* (by 0.32 or by 7.27%). A decline in averages of the *EBF* is obvious for separate groups of countries as well:

- for countries with  $5.00 \leq GCI \leq 5.99$  an average of *EBF* decreased by 0.29 (or by 5.02%)
- for countries with  $4.00 \leq GCI \leq 4.99$  an average of *EBF* went down by 0.42 (or by 9.77%)
- for countries with  $3.00 \leq GCI \leq 3.99$  an average of *EBF* diminished by 0.39 (or by 10.4%)
- for countries with  $2.5 \leq GCI \leq 2.99$  an average of *EBF* declined by 0.5 (or by 14.93%).

Notably, the lower is *GCI* of a specific group of countries, the higher is decline in *EBF* averages in percentage terms.

Thus, in 2017–2018 as compared with 2006–2007, as a whole we see a certain decline in the *EBF* globally.

As against 2006–2007, 2017–2018 coefficients of correlation between *EBF* score and *GCI* score went down by 0.01 and constituted 0.85 for 116 national economies.

Table 7 shows a change in *EBF* score ( $\Delta EBF$ ) and *GCI* score ( $\Delta GCI$ ) in 2017–2018 as compared with 2006–2007 for 116 national economies; see formulas (5) to (6).

$$\Delta EBF = EBF_{Score_2} - EBF_{Score_1}, \quad (5)$$

$$\Delta GCI = GCI_{Score_2} - GCI_{Score_1}, \quad (6)$$

where

$\Delta EBF$  a change in *EBF* score

$\Delta GCI$  a change in *GCI* score

$EBF_{Score_1}$  *EBF* score in 2006–2007

$EBF_{Score_2}$  *EBF* score in 2017–2018

$GCI_{Score_1}$        $GCI$  score in 2006–2007

$GCI_{Score_2}$        $GCI$  score in 2017–2018.

In 2017–2018 (in comparison with 2006–2007), 32 (27.59%) out of 116 national economies boast a non-negative change in  $EBF$  score, with 29 countries (90.63%) with improved  $GCI$  score.

**Table 7**      Change in  $EBF$  score ( $\Delta EBF$ ) and  $GCI$  score ( $\Delta GCI$ ) for 116 national economies in 2017–2018 as against 2006–2007

<i>Economy</i>	$\Delta EBF$	$\Delta GCI$	<i>Economy</i>	$\Delta EBF$	$\Delta GCI$	<i>Economy</i>	$\Delta EBF$	$\Delta GCI$
Tajikistan	1.1	0.64	Mongolia	-0.1	0.30	Madagascar	-0.6	0.13
UAE	0.9	0.64	Belgium	-0.1	-0.04	Slovenia	-0.6	-0.16
China	0.7	0.76	Gambia	-0.1	0.18	Trinidad and Tobago	-0.6	0.06
Indonesia	0.7	0.42	Hong Kong SAR	-0.1	0.07	Argentina	-0.6	-0.06
Qatar	0.6	0.56	Ireland	-0.1	-0.05	Burundi	-0.6	0.62
Kyrgyz Republic	0.6	0.59	New Zealand	-0.1	0.22	Croatia	-0.6	-0.07
Albania	0.6	0.72	Uruguay	-0.1	0.19	Nicaragua	-0.6	0.43
Russian Federation	0.6	0.56	Israel	-0.2	-0.07	Thailand	-0.6	0.14
Armenia	0.5	0.44	Benin	-0.2	0.10	Egypt	-0.6	-0.17
Bahrain	0.5	0.26	Cambodia	-0.2	0.54	Portugal	-0.6	-0.03
Ethiopia	0.5	0.79	Poland	-0.2	0.29	France	-0.7	-0.13
Azerbaijan	0.4	0.63	Vietnam	-0.2	0.47	Algeria	-0.7	0.17
Bangladesh	0.4	0.45	Cameroon	-0.2	0.35	Nigeria	-0.7	-0.15
Georgia	0.4	0.55	Luxembourg	-0.2	0.07	Venezuela	-0.7	-0.46
Estonia	0.3	-0.27	Mozambique	-0.2	-0.05	Zimbabwe	-0.7	0.31
Nepal	0.3	0.76	Bosnia and Herzegovina	-0.3	0.20	Iceland	-0.7	-0.41
Ukraine	0.3	0.22	Honduras	-0.3	0.34	Malawi	-0.7	0.04
Jordan	0.2	0.05	Latvia	-0.3	-0.17	UK	-0.7	-0.03
Kazakhstan	0.2	0.16	Malta	-0.3	0.11	Guatemala	-0.8	0.17
Japan	0.1	-0.11	Norway	-0.3	-0.02	Slovak Republic	-0.8	-0.22
Kenya	0.1	0.41	Paraguay	-0.3	0.38	Turkey	-0.8	0.28
Philippines	0.1	0.35	Lesotho	-0.3	-0.02	Ecuador	-0.9	0.24
Uganda	0.1	0.51	Romania	-0.3	0.26	Mali	-0.9	0.31
India	0.1	0.15	Canada	-0.3	-0.02	Dominican Republic	-1.0	0.12
Morocco	0.1	0.23	Australia	-0.4	-0.10	Germany	-1.0	0.07

*Source:* Calculated by the authors based on World Economic Forum (2007, 2018)

**Table 7** Change in *EBF* score ( $\Delta EBF$ ) and *GCI* score ( $\Delta GCI$ ) for 116 national economies in 2017–2018 as against 2006–2007 (continued)

<i>Economy</i>	$\Delta EBF$	$\Delta GCI$	<i>Economy</i>	$\Delta EBF$	$\Delta GCI$	<i>Economy</i>	$\Delta EBF$	$\Delta GCI$
Sri Lanka	0.1	0.21	Botswana	-0.4	0.51	Kuwait	-1.0	0.02
Mauritius	0	0.32	Costa Rica	-0.4	0.25	Korea, Rep.	-1.1	-0.06
Namibia	0	0.25	Bulgaria	-0.4	0.50	Brazil	-1.1	0.11
Netherlands	0	0.10	Chad	-0.4	0.38	South Africa	-1.1	-0.04
Singapore	0	0.08	Italy	-0.4	0.08	Chile	-1.2	-0.14
Switzerland	0	0.05	Czech Republic	-0.4	0.03	Hungary	-1.2	-0.19
Taiwan, China	0	-0.08	Sweden	-0.4	-0.22	Peru	-1.2	0.28
Jamaica	-0.1	0.15	Panama	-0.5	0.26	Mexico	-1.4	0.26
Lithuania	-0.1	0.05	Austria	-0.5	-0.07	Mauritania	-1.4	-0.08
Malaysia	-0.1	0.06	Denmark	-0.5	-0.31	Spain	-1.4	-0.07
Pakistan	-0.1	0.01	Finland	-0.5	-0.27	Colombia	-1.5	0.25
Tanzania	-0.1	0.32	Zambia	-0.5	0.36	Tunisia	-1.5	-0.78
USA	-0.1	0.24	Cyprus	-0.5	-0.06	El Salvador	-1.7	-0.32
Moldova	-0.1	0.28	Greece	-0.6	-0.31			

*Source:* Calculated by the authors based on World Economic Forum (2007, 2018)

**Table 8** Change in *EBF* score ( $\Delta EBF$ ) for 33 national economies with significantly improved *GCI* score ( $\Delta GCI \geq 0.3$ ) in 2017–2018 as against 2006–2007

<i>Economy</i>	$\Delta GCI$	$\Delta EBF$	<i>Economy</i>	$\Delta GCI$	$\Delta EBF$	<i>Economy</i>	$\Delta GCI$	$\Delta EBF$
Ethiopia	0.79	0.50	Georgia	0.55	0.40	Chad	0.38	-0.40
China	0.76	0.70	Cambodia	0.54	-0.20	Paraguay	0.38	-0.30
Nepal	0.76	0.30	Botswana	0.51	-0.40	Zambia	0.36	-0.50
Albania	0.72	0.60	Uganda	0.51	0.10	Cameroon	0.35	-0.20
Tajikistan	0.64	1.10	Bulgaria	0.50	-0.40	Philippines	0.35	0.10
UAE	0.64	0.90	Vietnam	0.47	-0.20	Honduras	0.34	-0.30
Azerbaijan	0.63	0.40	Bangladesh	0.45	0.40	Tanzania	0.32	-0.10
Burundi	0.62	-0.60	Armenia	0.44	0.50	Mauritius	0.32	0.00
Kyrgyz Republic	0.59	0.60	Nicaragua	0.43	-0.60	Mali	0.31	-0.90
Qatar	0.56	0.60	Indonesia	0.42	0.70	Zimbabwe	0.31	-0.70
Russian Federation	0.56	0.60	Kenya	0.41	0.10	Mongolia	0.30	-0.10

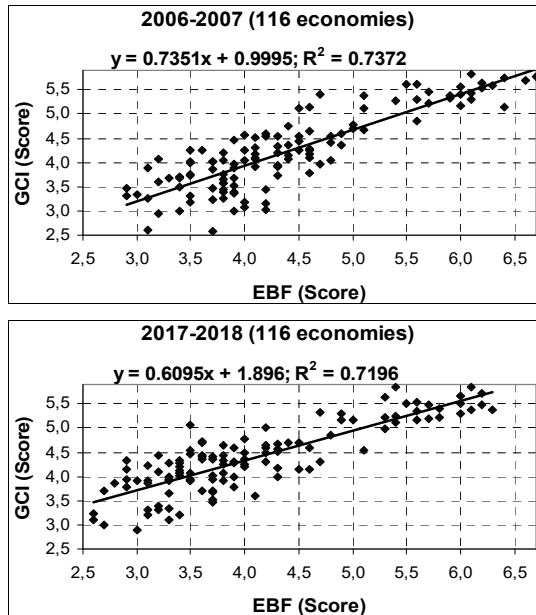
*Source:* Calculated by the authors based on World Economic Forum (2007, 2018)

In 2017–2018 (as compared with 2006–2007), 84 (72.41%) out of 116 national economies have a negative growth in *EBF* score, with 34 countries (40.48%) with degraded *GCI* score.

Importantly, in 2017–2018 as against 2006–2007, correlation coefficient between *EBF* growth ( $\Delta EBF$ ) and *GCI* growth ( $\Delta GCI$ ) made up 0.56 for 116 national economies.

Table 8 shows a change in *EBF* score ( $\Delta EBF$ ) for 33 national economies, which significantly improved *GCI* score ( $\Delta GCI \geq 0.3$ ) in 2017–2018 as compared with 2006–2007. Among 33 national economies with significantly improved *GCI* score (by 0.3 and more), 18 countries (54.55%) also boosted *EBF* score. Among 16 national economies with significantly improved *GCI* score (by 0.5 and more), 12 countries (75%) also boosted *EBF* score.

**Figure 7** Linear equations of dependence between *EBF* score and *GCI* score for 116 national economies in 2006–2007 and 2017–2018



Source: Graphed by the authors based on World Economic Forum (2007, 2018)

For 116 national economies, we have set up linear equations of dependence between *EBF* score and *GCI* score in 2006–2007 and 2017–2018; see Figure 7, formulas (7) to (8).

$$GCIScore_1 = 0.7351 \cdot EBFScore_1 + 0.9995, \tag{7}$$

$$GCIScore_2 = 0.6095 \cdot EBFScore_2 + 1.896. \tag{8}$$

$R^2$  coefficient for the equation (7) equals 0.7372, and for the equation (8)  $R^2 = 0.7196$ . The analysis of the formulas (7) to (8) shows that in 2017–2018 as compared with 2006–2007 the impact of the *EBF* on the *GCI* slightly decreases though remains significant. It is further proved by correlation coefficients between *EBF* rank and *GCI* rank given in Table 2.

Let us check the above models' adequacy, i.e., examine how the linear regressions agree with our observations. We shall introduce designations as follows:  $n$  – the number of countries under study,  $k$  – the number of factors,  $R^2$  – determination coefficient of a constructed model.

We shall check adequacy using an F-test, which consists of the following steps.

Step 1 To calculate the actual value of Fisher statistic ( $F_{\text{fact.}}$ ) by formula:

$$F_{\text{fact.}} = \frac{R^2}{1 - R^2} \cdot \frac{n - k - 1}{k}.$$

Step 2 To set a value of the level of significance  $\alpha$ . Further we shall consider  $\alpha = 0.05$ , meaning as follows: upon examination of the corresponding statistic hypothesis, it is possible to err not more than in  $\alpha \cdot 100 = 0.5 \cdot 100 = 5\%$  cases.

Step 3 To calculate the critical value of Fisher statistic ( $F_{\text{tabl.}}$ ) by formula:

$$F_{\text{tabl.}} = F_p(n_1; n_2),$$

where  $F_{\text{tabl.}} = F_p(n_1; n_2)$  is a critical value of  $p$ -fractile of Fisher distribution with  $n_1$  and  $n_2$  degrees of freedom,  $p = 1 - \alpha$ ,  $n_1 = k$ ,  $n_2 = n - k - 1$ . Provided that  $\alpha = 0.05$  and all constructed models are single-factor ones, we have

$$p = 1 - \alpha = 1 - 0.05 = 0.95, \quad n_1 = k = 1, \quad n_2 = n - k - 1 = n - 1 - 1 = n - 2$$

$$F_{\text{tabl.}} = F_p(n_1; n_2) = F_{0.95}(1; n - 2).$$

Step 4 To make a statistic decision according to the rule: if inequality  $F_{\text{fact.}} < F_{\text{tabl.}}$  holds true, then at the given level of significance  $\alpha$ , i.e., with the risk of error not more than in  $\alpha \cdot 100\%$  cases, a constructed model should be considered adequate; if inequality  $F_{\text{fact.}} > F_{\text{tabl.}}$  holds true, then at the given level of significance  $\alpha$ , i.e., with the risk of error not more than in  $\alpha \cdot 100\%$  cases, a constructed model should be considered inadequate.

Table 9 gives the results of check of the constructed models for adequacy.

**Table 9** Results of check of constructed models for adequacy with level of significance  $\alpha = 0.05$

#	Model	$R^2$	$F_{\text{fact.}}$	$n_2 = n - 2$	$F_{\text{tabl.}}$	Conclusion
1	$y = 0.7617x + 16.444$	0,5802	186,5817	135	3,9113	adequate
2	$y = 0.6197x + 1.7868$	0,6832	291,1364	135	3,9113	adequate
3	$y = 0.4974x + 8.7544$	0,5006	34,0817	36	4,1300	adequate
4	$y = 0.4113x + 3.036$	0,6303	57,9665	36	4,1300	adequate
5	$y = 0.5238x + 7.3016$	0,6102	53,2242	36	4,1300	adequate
6	$y = 0.4386x + 2.9132$	0,7268	90,4510	36	4,1300	adequate
7	$y = 0.7351x + 0.9995$	0,7372	319,7900	116	3,9243	adequate
8	$y = 0.6095x + 1.896$	0,7196	292,5621	116	3,9243	adequate

## 6 Conclusions

The firm is a complex open dynamic socio-economic system, which consists of a great number of interconnected and interacting elements. The firm constantly interacts with the external environment.

The firm's sustainable development is the key objective, on which the efforts of management and staff shall be focused. The survival of the firm in constantly evolving external environment is impossible without preservation of its competitiveness in the short-, medium- and long-term. The dynamic nature of the external environment demands constant actions and development from the firm. To remain a comprehensive relatively autonomous system, the firm shall constantly make sound and timely decisions and implement them.

The external environment can have a positive and negative impact on the firm. In its turn, the firm can influence the external environment both positively and negatively. In its everyday performance and decision making, the firm must comply with the code of ethics. Decisions going against social and ethical standards are not to be made and implemented. The level of ethics during decision making will definitely influence the firm's reputation, if not instantly, then for sure in the long-term. Reputation is one of the most important assets of the firm and greatly influences the firm's competitiveness. The firm's sustainable development is impossible without a good reputation.

Presently, business performs in a highly dynamic environment under constantly growing global competitiveness. From year to year, new technologies are more and more rapidly developed and applied to produce goods and services. The development of state-of-the-art technologies (including digital ones) has not lowered risks of business activities and threats for the firm. On the contrary, business risks have even increased.

There are instances where the introduction of new technologies and innovations can result in extra risks and threats for the firm's external environment as well. That is why such projects and innovations shall be thoroughly studied at the pre-investment stage of the project's lifecycle. They shall do no harm to the health of consumers and staff; they should not damage the natural environment, etc.

An additional threat for the firm's safety is a decrease in corporate reputation due to firm's initiatives and activities. That is why ethical aspects are to be taken into consideration by managers in their decision making. Year after year, the firm's performance is getting more and more visible for the community. A negative impact on corporate reputation constitutes a threat to the firm's safety. The firm has to remain an integral relatively autonomous system and ensure its safety. Each firm aims at minimisation of probable threats, their timely exposure and prevention. And, of course, the firm should not create threats by going against ethics. The firm's ethical behaviour contributes to preservation of its competitiveness and, accordingly, to its safety.

The firm is the key player in market economy. The competitiveness and performance of national business significantly influence the competitiveness of national economy. At the same time, a country's competitiveness defines the opportunities of domestic business to grow.

A host of interrelated factors shape national economy's competitiveness. However, this study aims to evaluate only the impact of ethical aspects on national economy's competitiveness. To analyse the impact of EBF on national economy's competitiveness, we have studied data given in 2006–2018 Global Competitiveness Reports of the World Economic Forum.

These findings testify to a rather strong impact of the EBF on national economies' competitiveness globally. Also, it is possible to assume that the index under study has a similar influence on a company (firm), as competitive economy is impossible without competitive enterprises. Taking into consideration received interrelations, we can say that in 2017–2018 on average:



- a national economy's shifting one position upwards or downwards the 'EBF' rating triggered off a respective climb or fall in the place in the GCI by 0.7617
- an increase (decrease) in *EBF* score by 1 was accompanied by a respective increase (decrease) in *GCI* score by 0.6197.

The conducted research shows that higher averages of EBF are characteristic of countries with higher GCI.

The analysis shows that in 2017–2018 as compared with 2006–2007 the impact of the EBF on the GCI slightly decreases though remains significant.

The research paper constructs several models (linear equations) of dependence between the EBF and the GCI. We checked the constructed models for adequacy using an F-test. All the models proved to be adequate.

The above proves that the firm's ethical behaviour decreases risks and threats not only for the firm, but also for the national economy as a whole, and contributes to its safety.

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