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Creative destruction and development of the global economy

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ABSTRACT

Objective: The objective of the article is to empirically recognize the significance of creative destruction for the development of contemporaneous global economy, in particular: (1) the influence of creation and destruction on development processes and how this influence changed over time; (2) the effects of creation and destruction on disparities in the level of development between the so-called 'countries of the South and the North.'

Research Design & Methods: We conducted the econometric analysis for the years 1970-2020, which we divided into four analytical periods. We used time series data from the UNCTAD database for 220 countries, the group of developing countries, and the group of developed countries. We used evometrics to measure creative destruction, which enabled its decomposition into the innovation effect (creation) and the selection effect (destruction). Modelling comprised two economic categories: GDP *per capita* dynamics and development gap index, relating them to the innovation and selection effects. We used linear regression and estimated the parameters using the OLS.

Findings: Our results showed that both creation and destruction had a positive influence on the global GDP *per capita* dynamics and destruction played a dominant role in this process. Its impact increased over time. The growth of creation and destruction resulted in the increased dynamics of the development gap, which we can consider as a specific cost of development based upon creative destruction. In the period of profound geopolitical transformations in the world economy (1982-1998) creation did not affect the development of the global economy and the dynamics of development gap.

Implications & Recommendations: Our results indicate that the full use of the development potential created by innovations requires uninterrupted operation of not only creation, but also properly functioning destruction. Some scholars postulate eliminating destruction from development processes. However, this may lead to a prosperity loss. The cost of creative destruction is not destruction as such but its erroneous operation caused, for example, by institutional, political, and economic factors. In the context of the economic policy of developing countries, this statement implies that solutions aimed at stimulating innovations should be accompanied by activities facilitating the transfer of resources from less to more effective uses.

Contribution & Value Added: Modification of the theoretical construction of Schumpeter, enabling both theoretical and empirical analysis of the role of creative destruction in the processes of development of the world economy. The use of evometrics as a tool for measuring creative destruction at the level of the global economy. The results of the study constitute an important contribution to the discussion on the role of creative destruction in development processes, especially concerning destruction, which is commonly assigned a pejorative meaning and identified with the cost of implementing innovations.

Article type: research article

Keywords: creative destruction; economic development; development gap; global economy; evometrics

JEL codes: O10, F01, F63

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INTRODUCTION

In the light of profound structural and market transformations of the contemporaneous world economy, resulting from and accompanying the internationalization and emergence of the global economy, it is hard to disagree with Misala's opinion (2009) that while the overall economic goal, *i.e.* the growth of a broadly understood well-being has been and continues to be a kind of constant magnitude, conditions for its accomplishment are subject to changes. Characteristic features in the development of the modern world economy are not only the increasing complexity and rate of the processes, or specific events compression (of 'time-space' type) (Misala, 2009) but also, and perhaps above all, a more and more noticeable syndrome of the so-called 'economy of impermanence' (Mączyńska, 2012). The capacity to create new technologies, increasing at an exponential rate, and the multiplicative nature of the implemented technologies (Kurzweil, 2005) consolidate the impermanence trend, being responsible for the fact that the linear progression model no longer adequately describes the world. Moreover, changes occurring in the global economy in recent decades do not involve simple quantitative growth or qualitative leaps but are experienced as a kind of cataclysm – accumulated effects of a 'continuous discontinuous change' (Borkowski, 2001).

When considering the development of the modern global economy, it is impossible to ignore various types of imbalances increasing on a global scale: social, demographic, and ecological (Aghion *et al.*, 2021; Begović, 2021; Courvisanos, 2012). Although imbalance as such is not a core of the problem but the driving force of progress, the disparities deepening on the world's scale (poles of wealth and poverty) make us reflect on the effects of an explosive development of the so-called 'innovation civilization' (Borkowski, 2001). According to Mączyńska (2012, p. 170), successive waves of innovations lead 'not only to a desirable "creative reconstruction" or creative destruction, but also to the destruction involving irreversible, or hardly reversible, far-reaching effects, social, economic, ecological, and spatial which radically change the situation and living conditions of people, businesses, institutions, and countries'. Currently, we see in the literature that scholars replace a belief in technological progress as an antidote to all the world's ailments ensuring an increase in global welfare with questions about socially acceptable costs of innovations and ways 'to harness' creative destruction (Aghion *et al.*, 2021).

The need for an in-depth discussion postulated by Mączyńska (2012) as regards creation and destruction in the world economy, particularly important in the context of events of the last few decades (financial crisis 2007/2008, COVID-19 pandemic) was an incentive for us to undertake the analyses with an aim to empirically recognize the significance of creative destruction in the development of modern global economy, in particular, to examine:

- the influence of creation and destruction on development processes and to determine whether this influence was subject to change over time;
- effects of creation and destruction on disparities in the level of development between the so-called 'countries of the North and the South.'

Schumpeterian theory of economic development and evolutionary economics constituted the theoretical frameworks for our research concept. The application of Schumpeterian theory for the analysis of the development of the world economy required modifications which would consider the global research perspective, leaving the essence of creative destruction unchanged. Those modifications concerned:

- the structure of an economic system and the transfer of creation and destruction waves in that system;
- the way creation and destruction are manifested.

We formulated the conclusions based on econometric analysis for the years 1970-2020. The research exploited a time series of data coming from the UNCTAD database for 220 countries, the entire world economy, the group of developing countries, and the group of developed countries. Moreover, we applied evometrics in contrast to the usual measures of creative destruction used in the relevant literature (indicators based on entries/exits of firms (firm rotation), job creation/job destruction (employment rotation),

patents, or instability of financial indicators). Evometrics is a method of quantification of creative destruction. It originates from biological sciences – Fisher's theorem on natural selection (Andersen, 2004a; Frank, 1997) – and Price applied it to describe the mechanism of evolutionary processes (Andersen, 2004b; Gardner, 2020; Price, 1970). It allows for the decomposition of creative destruction into the innovation effect and the selection effect (Andersen, 2004a) at various levels of data aggregation. To our knowledge, so far scholars have not used this method as a tool to measure creative destruction at the level of the global economy. Applying evometrics in our study made it possible to combine the conceptual sphere with the empirical level/plane and to enrich the considerations of numerous authors, who typically base their research on qualitative analysis, with conclusions resulting from strictly quantitative analyses.

In the next part of the article, we presented a theoretical concept of the impact of creative destruction on the development of the global economy (multi-structure). In the following part of the article, we included information about the data/indicators used in the empirical analysis and the research method. In the fourth part, we presented the results of the econometric study and their interpretation. In the last part of the article, we included the most important conclusions and limitations of our research, as well as directions for further studies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

According to Schumpeter's theory (1939, 1949), broadly understood innovations are the source of development processes, while creative destruction is a mechanism through which the economy enters higher growth paths. The introduction of innovations, equivalent in Schumpeter's theory to the creation of new entities, disrupts the existing economic equilibrium and triggers the processes of imitation and knowledge diffusion – a wave of creation. New methods of production, new goods and services, new sales techniques, and new technological-organizational solutions implemented within the frameworks of innovations differentiate economic entities. In turn, this differentiation is the basis for the functioning of market selection. The entities which become ineffective in the new conditions are forced either to reduce the scope of their activities or to terminate them. This *de facto* means pushing old products, technologies, organizational types, etc. out of the market, *i.e.* the wave of destruction. Therefore, the core of creative destruction described by Schumpeter is two inextricably linked phenomena:

- construction of qualitatively different, new elements of an economic system – creation;
- elimination of old, ineffective elements of the economic structure – destruction.

The consequence of creative destruction is the transformation of the economic structure combined with the improvement of effectiveness.

The Schumpeterian economic system (a two-level, closed economy) where innovations are exclusively endogenous and creative destruction occurs only inside a traditionally defined national economy, cannot be directly applied to the analysis of modern development processes. Internationalization, globalization, and international integration are responsible for the fact that national economies are no longer relatively autonomous systems; they lose 'their distinctiveness' and become interrelated components of a wider system, where economic processes occur not only within but also beyond the borders of its member countries. The world economy is assumed to be a multi-level economic system (multi-structure) created by national economies (macro level) and their internal structures (meso-, micro-levels) which, through international and institutional links shaping it, constitutes the global space for the operation of creative destruction and development processes. The development of multi-structure is a consequence of the processes occurring at the lower hierarchical levels and the mechanism of development impulses' transmission (creative destruction) is consistent with a multi-level version of the Price equation (Andersen, 2004a). The construction of the multi-level version of the Price equation is based on two assumptions:

- innovation (creation) is any new differentiation, regardless of the source of its origin and the system's hierarchical level. According to Fisher, such a variance is the basis for the functioning of selection (destruction), which, in turn, restricts this variance. According to Fisher's theorem, if selection favours the degree to which a given trait is present among individuals of a population, then the rate

of change in the average value of that trait is proportional to the differentiation (variance) of that trait in a given population (Andersen, 2004c). The greater the variance of a trait, the greater the intensity of selection processes;
- the result of creation and destruction occurring at a given level of the structure is the creation at a higher hierarchical level (*i.e.* a new variance of the elements belonging to that level) (Figure 1).

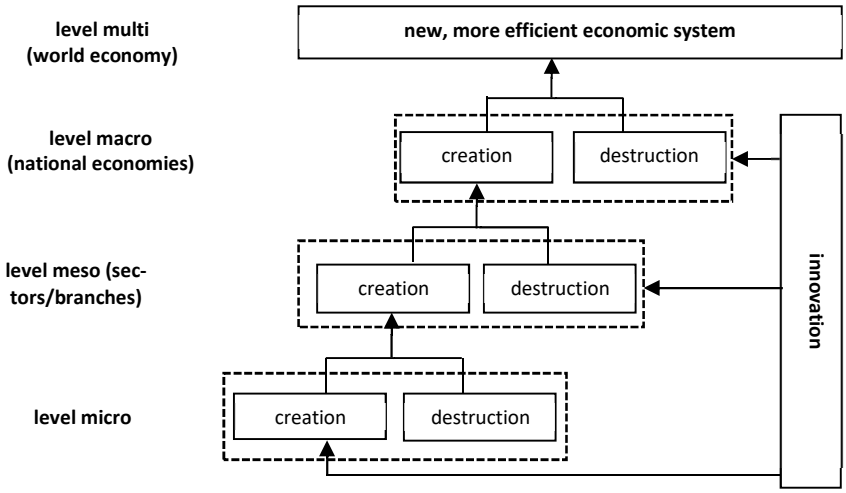

Figure 1. The mechanism of transmission of creative destruction in a multi-structure
Source: own elaboration.

The presented mechanism of creative destruction transmission implies that the innovation (creation), differentiation it involves, and selection (destruction) based upon this differentiation, in contrast to Schumpeter's views, are not only the attributes of processes occurring at the micro-level (inside individual entities and among them) but they are also manifested at all levels of the structure of world economy. At the level of national economies (macro level), creative destruction occurring at the lower levels of the structure (meso-, micro) is visible in differentiated rates of their growth (creation) and in changes of their shares in the world economy (destruction). The mechanism of selection, 'promoting' better economies, is responsible for the fact that their share in the world economy increases, simultaneously limiting the share of weaker economies. Therefore, destruction does not involve a literal demolition (elimination) of national economies, but it involves a reduction of their importance in the global system, pushing out economically, technologically, and resource-weaker economies to the peripheries of the world economy. The ultimate result of creative destruction is, at least in the assumptions, the creation of a new, more effective world economy, characterized by a higher rate of economic growth. We concretised those theorems in the research hypothesis:

H1: Creation and destruction positively influence the development of the world economy.

Considering that creation results in additional differentiation, whereas selection leads to its limitation, we formulated the second research hypothesis:

H2: Creation causes an increase of disparities in the level of development between 'the South and the North' economies, whereas destruction contributes to the reduction of those disproportions.

The basis for verification of the hypotheses was empirical research, the concept of which we present further in the article.

RESEARCH METHODOLOGY

In the study, we used yearly statistical data published by UNCTAD for 220 countries, the entire world economy, the group of developing countries, and the group of developed countries in the years 1970-

2020. The time range of the research was dictated by the availability of accessible comparable time series. We expressed all data in fixed prices for the year 2015.

According to evolutionary economists, different historical periods are characterized by variable dynamics of technological progress and different significance of innovation and imitation for economic growth (Fagerberg & Verspagen, 2002). Therefore, we distinguished four subperiods of analysis, while considering important events for the development of the world economy, such as the oil crises of the 1970s, the debt crisis, dot-com boom (technological innovation), and financial crises (financial innovation – financial engineering). The analysed subperiods covered the years: 1970-1981, 1982-1998, 1999-2008, and 2009-2020. Since the decision to select cut-off dates for the subperiods was arbitrary, we tested its validity using the Chow breakpoint test.

We subjected two economic categories to econometric modelling:

- the development of the world economy measured by GDP *per capita* dynamics (variable *G*),
- the development gap index which measures changes of disproportions in the level of development between the developing and developed countries. This index is expressed as dynamics of the difference between the levels of GDP *per capita* in the developed and developing countries (variable *D_L*),

assuming that these categories are influenced by the processes of creative destruction occurring in the world economy, *i.e.* inside and among national economies constituting the multi-structure.

To estimate the processes of creative destruction in the world economy, we applied evometrics (*evolutionary econometrics*) (Andersen, 2004a; Andersen *et al*., 2006). It permits the decomposition of creative destruction processes into the selection effect (variable *ES*) measuring destruction, and the innovation effect (variable *EI*) which is the measure of creation. We calculated the values of creative destruction indexes based on the GDP of individual countries according to the formulae:

$$ES_t = \frac{\sum_j u_{jt}\left(w_{jt} - w_t\right)^2}{w_t} \tag{1}$$

$$EI_t = \frac{\sum_j u_{jt} w_{jt} \Delta w_{jt}}{w_t} \tag{2}$$

in which:

$w_{jt} = \frac{GDP_{jt}}{GDP_{jt-1}}$ - absolute reproduction coefficient of country *j* in year *t,*

Δw_{jt} - change in reproduction coefficient of country *j* in year *t*,

u_{jt} - share of country *j* in generating world economy's GDP in year *t,*

$w_t = \sum_j u_{jt}\, w_{jt}$ - weighted average reproduction coefficient of the world economy in year *t*.

Since in the years 1970-2020 geopolitical changes occurred in the world economy – the emergence of the new and liquidation of the old countries (*e.g.* the collapse of the USSR and Yugoslavia and unification of Germany), the number of national economies being the basis for calculating the innovation and selection effects differed in particular periods.

According to the multi-level version of Price equation (Andersen, 2004a), the value of innovation effect (*EI*) shows the aggregated, visible at the level of the world economy, result of creative destruction processes taking place within national economies of the analysed countries. The selection effect (*ES*) expresses the results of 'market selection,' occurring among national economies and observed at the level of the world economy.

We analysed the role of creative destruction in the development of the world economy in two stages. In the first stage estimations included the parameters of regression equations, in which the development index of the world economy (variable *G*) was the explained variable:

$$G = C + \alpha_1 EI + \alpha_2 D1 * EI + \alpha_3 D2 * EI + \alpha_4 D3 * EI \tag{3}$$

$$G = C + \alpha_1 ES + \alpha_2 D1 * ES + \alpha_3 D2 * ES + \alpha_4 D3 * ES. \tag{4}$$

We assigned the binary variables the following values: *D1* = 1 for the years 1982-1998, *D2* = 1 for the years 1999-2008, *D3* = 1 for the years 2009-2020.

To compare the force of influence exerted by innovation and selection effects on GDP *per capita*, we estimated parameter of analogous regression equations using standardized values of independent variables (*EI_S*, *ES_S*).

In the second stage, we analysed the influence of innovation and selection effects on the development gap index (variable *D_L*):

$$D\_L = C + \alpha_1 EI + \alpha_2 D1 * EI + \alpha_3 D2 * EI + \alpha_4 D3 * EI \quad (5)$$

$$D\_L = C + \alpha_1 ES + \alpha_2 D1 * ES + \alpha_3 D2 * ES + \alpha_4 D3 * ES. \quad (6)$$

We used binary variables in all regression equations to find out whether the influence of innovation and selection effects on dependent variables (*G*, *D_L*) was subject to changes over time. The statistical insignificance of parameters α_2, α_3, and α_4 implies that the influence of *EI*, *ES* in the distinguished subperiods 1982-1998, 1999-2008, 2009-2020 did not differ from the subperiod 1970-1981. On the other hand, the statistical significance of parameters α_2, α_3, and α_4 means that the influence of the innovation effect and/or selection effect on the dependent variables was different in the distinguished subperiods. The force of impact of the independent variable exerted on the dependent variable in the years 1982-1998, 1999-2008, and 2009-2020 was defined, respectively, by the sums of coefficients: $\alpha_1 + \alpha_2$, $\alpha_1 + \alpha_3$, $\alpha_1 + \alpha_4$, whose statistical significance was verified by the Wald test.

Before the estimation of regression equations, we checked for variables' stationarity using the Augmented Dickey-Fuller test (ADF test) (Greene, 2012). To estimate regression parameters, we applied the ordinary least squares (OLS) method. We checked the normality of residuals' distribution with the Jarque-Bera test (Hill *et al*., 2011). To verify the assumption of homoskedasticity of the regression residuals we used the Breusch, Pagan, and Godfrey test (Gujarati, 2004; Hill *et al*., 2011; Greene, 2012). To verify the hypothesis about the lack of autocorrelation of the residual component, we used the Breusch and Godfrey test (Gujarati, 2004). When we found the autocorrelation of the residual component, we applied the OLS with AR errors (Wooldridge, 2002; Baltagi, 2005). When the autocorrelation of residuals was accompanied by heteroskedasticity, we used the OLS with the heteroskedasticity and autocorrelation consistent standard errors (HAC) (Greene 2012). The statistical significance of the test results was at the level α = 0.05.

We present the results obtained from empirical analyses and their interpretation in further parts of the article. We paid special attention to the results which are most important from the viewpoint of the research goal. Detailed results of the analysis will be made available at the reader's request.

RESULTS AND DISCUSSION

The unit root test revealed the stationarity of all the variables accepted for the study (Table 1). The results of the Chow breakpoint test showed that there were grounds to reject the null hypothesis of no structural change in years 1982, 1999, 2009, and therefore confirmed the validity of the adopted division of the research period into four analytical subperiods (Table 2).

Table 1. Results of the ADF test with constant and linear trend (H0: Variable has a unit root)

Variable	ADF test statistic	Probability
EI	-6.772586	0.0000
ES	-4.459568	0.0044
G	-4.452718	0.0045
D_L	-5.743512	0.0001

Source: own study based on calculations in EViews 11.

Table 2. Results of the Chow breakpoint test (H0: No breaks in 1982, 1999, 2009)

Equation	Wald statistic	Probability
$G = C + \alpha * EI$	41.53129	0.0000
$G = C + \alpha * ES$	90.61262	0.0000

Source: own study based on calculations in EViews 11.

The results of the estimation of parameters of regression equations (3) and (4) (Table 3, Models A and B) show that creative destruction was a statistically significant factor shaping the development of the world economy in the studied period.

Table 3. Estimation results of parameters of equations (3)-(6)

Explanatory variables	*Model A (HAC)*	*Model B (HAC)*	*Model C (AR(1) errors)*	*Model D (AR(1) errors)*	*Model E*	*Model F (HAC)*
C	**101.69 [0.18]**	**-2.99 [1.06]**	**101.66 [0.27]**	**101.76 [0.44]**	**101.97 [0.24]**	-8.72 [5.90]
EI	**51.54 [9.31]**	–	–	–	**59.68 [23.74]**	–
*D1*EI*	**-66.98 [19.93]**	–	–	–	**-66.29 [32.56]**	–
*D2*EI*	-4.60 [10.97]	–	–	–	-4.33 [44.07]	–
D3 EI*	22.89 [23.93]	–	–	–	21.85 [30.33]	–
ES	–	**100.86 [1.04]**	–	–	–	**107.07 [5.67]**
*D1*ES*	–	0.19 [0.10]	–	–	–	0.39 [0.23]
*D2*ES*	–	**0.60 [0.05]**	–	–	–	-0.32 [0.46]
*D3*ES*	–	**0.70 [0.07]**	–	–	–	-0.63 [0.37]
EI_S	–	–	**1.02 [0.46]**	–	–	–
*D1*EI_S*	–	–	**-1.14 [0.51]**	–	–	–
*D2*EI_S*	–	–	-0.20 [0.82]	–	–	–
*D3*EI_S*	–	–	0.42 [0.48]	–	–	–
ES_S	–	–	–	**2.53 [0.04]**	–	–
*D1*ES_S*	–	–	–	0.09 [0.06]	–	–
*D2*ES_S*	–	–	–	-0.03 [0.08]	–	–
*D3*ES_S*	–	–	–	**0.12 [0.06]**	–	–
Statistics	R^2= 0.51; ^R^2= 0.46	R^2= 0.99; ^R^2= 0.99	R^2= 0.56; ^R^2= 0.5	R^2= 0.99; ^R^2= 0.99	R^2= 0.38; ^R^2= 0.32	R^2= 0.88; ^R^2= 0.87

Notes: Standard errors in parentheses. Statistically significant coefficients are in bold. In the models B, D, and F, we omitted two influential observations (1971 and 1972) and one untypical observation (1992) in the estimation process.
Source: own study based on calculations in EViews 11.

Both the innovation and the selection effects had a positive influence on the dynamics of GDP *per capita* in all the studied subperiods, except the years 1982-1998, when the innovation effect played a passive role in the development processes.[1] Considering that changes occurring in the years 1982-1998 were defined by some economists as 'specific innovation of the world economy' (Zielińska-Głębocka, 2012) within the frameworks of which a massive reshuffle of economic forces took place among different

[1] The sum of regression parameters for variables *EI* and *D1*EI* (Table 3, Model A) did not significantly differ from 0 (Wald test: H0: $\alpha_1 + \alpha_2 = 0$; F statistics = 0.77; p = 0.39).

regions and centres of the world, the obtained result may raise some doubts. However, we should pay attention to the fact that this specific kind of innovation was largely triggered by exogenous, politically conditioned factors. In that subperiod, the development of the global economy was influenced by conditions other than the innovation effect, which does not imply that innovation processes and creative destruction they involved had no place, especially because market selection continued to stimulate the growth of GDP *per capita* dynamics. Moreover, in the successive subperiods under analysis, the impact of the selection effect on the development of the global economy was getting stronger and stronger.[2]

We may draw similar conclusions as concerns the role of creative destruction in the development processes of the global economy from the results obtained by estimations of the regression equations, using standardized values of independent variables (*EI_S*, *ES_S*) (Table 3, Models C and D). The comparison of parameter values in both regression equations shows a predominant significance of the selection effect for the dynamics of the global GDP *per capita*. In the whole period under analysis, regression parameters for independent variable *ES_S* were higher than the values reported for independent variable *EI_S*, and in the years 2009-2020 the force of impact exerted by the selection effect on variable *G* was over 2.5 times stronger than that of the innovation effect.[3]

Table 3 presents the results of the estimation of regression equations for dependent variable *D_L* obtained during the second stage of research (Models E and F). Based on the obtained results, we may state that both the innovation effect and the selection effect were the factors which positively influenced variable *D_L* – an increase in the values of variables *EI* and *ES* essentially increased the dynamics of the development gap. Such a result implies that the growth of creation and destruction accelerated the increase of differences in the levels of GDP *per capita* between the developed and developing countries. This regularity did not apply to the innovation effect in the years 1982-1998, *i.e.* the period of the so-called 'specific innovation of the world economy.'[4]

Summarizing our results, we may conclude that:

- in the years 1970-2020 both creation and destruction positively influenced the dynamics of GDP *per capita*. This result means a positive verification of hypothesis H1;
- a specific 'cost' of the development of the world economy, based upon the creative destruction, was widening of the gap between the levels of GDP *per capita* in the groups of developed and developing countries. Therefore, such a result cannot be the basis for a positive verification of hypothesis H2 with reference to the selection effect;
- in the years 1982-1998, a period of profound geopolitical transformations in the global economy, creation was not an active component of the creative destruction mechanism shaping the development of the world economy and the development gap. In the other subperiods, the impact of creation on the development of global economy remained unchanged;
- the force of influence exerted on the world economy by the innovation and selection effects indicated that the destruction played a leading role in that process as its influence in the last two subperiods under analysis was getting stronger and stronger.

Recorded research results are convergent with those of the studies concerning the significance of market competition and selection in economic processes, according to which a full exploitation of the development potential created by innovations requires not only an undisturbed spread of the new knowledge (diffusion and imitation) but also the elimination of ineffective elements from the market, thus creating a space for new, better solutions. In the economy, the presence of factors disturbing destruction, such as *e.g.* market regulations and frictions, which inhibit the effective flow of labour

[2] Regression parameters for variables *D2*ES* and *D3*ES* were positive and statistically different from zero (Table 3, Model B). The force of impact of variable *ES* on dependent variable *G* in the years 1982-1998 did not significantly differ from that observed in the subperiod 1970-1981 and reached a value of 100.86. In the two successive subperiods, it amounted to: 101.46 in the years 1999-2008 and 101.56 in the years 2009-2020.

[3] The force of impact of the innovation effect in all the distinguished subperiods is expressed by value α_1= 1.02 (Table 3, Model C). The force of impact of the selection effect in the last subperiod is represented by the sum of regression coefficients $\alpha_1 + \alpha_4 = 2.66$ (Table 3, Model D).

[4] Wald test for zero hypothesis: H0: $\alpha_1 + \alpha_2 = 0$; F statistic = 0.09; p = 0.77 (Table 3, Model E).

(Ahmadiani *et al*., 2022; Elfayoumi, 2022); intra- and inter-sectoral barriers to the mobility of production factors (entry/exit barriers, transaction costs) (Bartelsman *et al*., 2004); economic policy oriented towards businesses protection (zombie companies) (Di Mauro & Syverson, 2020); intentional activities of enterprises to protect themselves from the effects of market selection (Tripsas, 1997) – all this leads to inefficient allocation of resources and their wastage. The productivity 'wedge' between the existing and optimal allocation of resources reflects the scale of institutional and market distortions that cause Schumpeter's selection and reallocation are not working properly (Bennett, 2021; Irandoust,2023; in print; Näf, 2022). In the context of the transmission mechanism of creative destruction impulses in the multi-structure presented in this study, this conclusion implies that the results of disturbances in the correct functioning of market selection at lower hierarchical levels (micro- meso-, macro) accumulate, leading finally to the weakening of development processes observed at the level of the world economy.

CONCLUSIONS

Our study confirmed that the development of the global economy requires not only innovation (creation), but also destruction. Moreover, in the last two subperiods of our analysis, destruction, whose essence is the elimination of inefficiency from the market and pro efficient allocation of resources, was decisive for the growth of GDP *per capita* of the world economy. Marginalization, even negation of the positive sense of destruction, or attributing the commonly known pejorative meaning to this word may lead to a false conclusion that elimination or limitation of destruction will make it possible to avoid the costs of development based upon innovations. However, our results lead to the conclusion that the loss of prosperity may be a real cost for the economy where destruction is 'harnessed.' Bearing in mind that the growth of destruction resulted in increased disparities between the developed and developing countries, this statement may raise some controversies. If, according to the expectations, the innovation effect increased differences in the levels of development, the result obtained for the selection effect contradicts the conclusions drawn from the catch-up hypothesis (Findlay, 1978), testifying in favour of the technological accumulation hypothesis (Castellani & Zanfei, 2007; Dunning & Lundan, 2008). Therefore, internationalization emphasized by many authors (foreign direct investment flows, international trade), which increases the supply of accessible technological knowledge, facilitates its diffusion, and widens sales markets, as well as intensified R&D activities (Grossman & Helpman, 1994; Sharma & Mishra, 2023) does not lead to the equalization of development levels through the mechanisms based on competition and selection.

When discussing the reduction of disproportions in the level of economic development, the authors focus on the problems of developing countries, linked with a deficit of innovations or implementation of new technologies. Our study suggests that the reason does not lie in the deficit of innovations or in the problems with imitation and diffusion of knowledge but in disturbances in the functioning of destruction. In the context of developing countries' policy, this statement implies that the solutions aimed to stimulate innovations should be accompanied by the activities facilitating the transfer of resources from the less to the more efficient applications, *e.g.* those removing the structural and institutional rigidity, characteristic of the countries from that group.

Our study is not without limitations. Firstly, our regression models did not allow for the separation of short- and long-run effects of creative destruction, which, according to the results of Asravor and Sackey's (2023) based on ARDL models, may be different – destruction processes play a greater role in the short run, and the domain of creation is the changes observed in a longer time horizon. Secondly, our classification of countries (developed/developing) is based on the distinction between developed and developing regions with the understanding that being part of either developed or developing regions is through the sovereign decision of a state (UNCTAD, n.d.). Therefore, this classification cannot be considered precise, and an alternative solution could be groups defined by economic criteria, for example, the classification of countries used by the World Bank according to income levels. Considering the positive correlation empirically confirmed for 166 countries between the number of patents per million of population and GDP *per capita* (Gürler, 2022), the division of countries based on the level of income may indirectly reflect the level of their technological development, which is important for

Schumpeterian (innovative) dynamism based on the ability to innovate and efficiency (Ahmadiani *et al*., 2022). Thirdly, the research concept presented here is certainly based upon a very simplified picture of how the world economy functions. Although our assumptions include differences in the levels of economic development, they omit many elements, significant for the modern world economy, such as *e.g.* international political, institutional, and economic connections which are responsible for the fact that the world economy may be treated as an economic system, a multi-structure. In this context, economic connections reflected in the share of individual countries in the global economy (in foreign trade, FDI flows) seem particularly important because numerous studies confirm the positive impact of trade liberalization and international flows of production factors on the efficiency of resource reallocation and productivity growth (Asravor & Sackey, 2023; Mao & Xu, 2023).

In our opinion, the reported results and general conclusions may be a starting point for the analyses which, to a higher extent, would adjust the theoretical concept to the conditions in which the modern world economy functions. In particular, such a research scheme should include:

- the possibility that creative destruction exerts a different influence on economic development in different groups of countries (developed/developing countries, high/low-income countries, countries of high/low technology level etc.);
- synergy effects among different groups of countries, which would make it possible to determine whether and how the processes of creative destruction in one group of countries modify the impact of creative destruction on economic development in the other group;
- internationalization, globalization, and integration of the markets of goods/services and production factors seen as the processes which modify the influence of creative destruction on economic development and the size of the development gap.

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