Fuzzy Estimation of Comprehensive Depreciation Indicators for 21 Developing Countries

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ABSTRACT:

Although depreciation is a crucial factor in economic growth models, little effort has been made to estimate depreciation rates. This study provides the integrated fuzzy indicators for the depreciation rates in 21 peer developing countries. Within the framework of fuzzy logic, first, ten related variables are combined to obtain four depreciation indicators, namely human, social, physical, and natural capital. Then the four indicators are combined to obtain an overall depreciation measure.

The results indicate that remarkable gap exists among developing countries. The overall depreciation rates are at the highest level in the CIS countries (circa 0.7) and at the lowest level in some of the developing European nations (circa 0.4).

Keywords:

Economic growth, Development, Depreciation, Fuzzy logic

JEL CLASSIFICATION:

O10, O44, O57

I. Introduction

In the past 60 years, the focus of growth and development economics was to determine the causes for the remarkable worldwide gap of GDP per capita. The main theme of the theories in this area was capital accumulation or the inflow of capital into the economy. Accordingly, modern growth theories emphasize on the influence of factors such as saving rate, knowledge spill over, creativity and innovation in the process of development.

Nevertheless, the contributing factors of the capital outflow from an economy, that is depreciation rate, are neglected. It seems that one of the main reasons for researchers to avoid investigating the determinants of depreciation rates is the absence of a comprehensive measurement for depreciation rates among countries. In this article this shortcoming is resolved by providing integrated indicators for depreciation rates in 21 developing countries. Accordingly, for the first time, a methodology is introduced for measuring comprehensive integrated depreciation rates within the framework of fuzzy logic.

This study contributes to the existing theory of growth economics in three possible ways:

First, depreciation rates are estimated for four types of capital, namely, physical, human, social, and natural for the first time. Furthermore, the integrated depreciation rates are provided by combining these four Indicators.

Second, fuzzy methodology has been utilized for its many advantages. Since fuzzy logic is an effective tool in the area of fuzzy sets, its usage in the ambiguous and multi-dimensional area of depreciation rate measurement is justified. On the other hand, the flexibility of the fuzzy method facilitates the provision of indicators that are comparable among the countries. In this method, 10 economic crisp variables are fuzzified into fuzzy linguistic variables. Through this step, small variation between two variables has no impact on the measurement of the depreciation rates; however, significant differences among economic variables result in noticeable variation in the final result of the depreciation rates.

On the other hand, the traditional statistical averaging methods are not suitable for combining depreciation measures into an integrated rate, because higher depreciation rates in only one area may result in complete demolition of the capital even if the depreciation rates of other types of capital remain low. For this reason, higher rate of even one of the above-mentioned depreciation rates can exacerbate the total integrated depreciation measurement. In micro level, suppose that in a manufacturing plant, fire detectors are installed to control losses to the physical capital; still failure is possible if the human resources management malfunctions. Likewise, in a country with high level of brain drain, the physical capital preservation might fail to reduce the total wear out of the capital.

Fuzzy estimation facilitates proper integration of economic variables and depreciation rates. In our work thanks to fuzzy logic, a combination of a high and a low depreciation rate results in high depreciation rate, which is consistent with the observation from the real world.

Third, the depreciation rates are calculated for 21 developing countries from four continents. Data availability was the main obstacle that restricted the expansion of the coverage of countries in this paper.

In the next section we briefly investigate the role and significance of depreciation rate in the theory of growth economics. Then, the methodology of fuzzy approach is discussed. Next, the fuzzy model of depreciation rate is introduced and the depreciation rates for human, social, physical, and natural capital and also the integrated depreciation rate for each of the countries are provided and analysed.

II. Theoretical Framework

Depreciation rate has been inseparable part of modern growth theory since Solow (1956); nevertheless, this rate is considered homogenous and constant among countries in empirical models. Hence the remarkable variations of capital preservation in different countries and cultures are ignored. In other words, depreciation is considered as an accounting rather than economic concept.

Depreciation rate for capital could be quite different among countries. For instance, although in some of the European countries ancient buildings are still in use for centuries, in some other developing countries, relatively new buildings could be demolished to be replaced with brand new properties. Similarly, the economic lifetime of infrastructures such as roads somewhat exceeds in the developed countries in comparison with the other developing and less developed countries.

It seems that in modern economies not only the quality of capital is higher, but also capital preservation is pursued seriously. In such countries, the required resources are available to enhance the quality of new investments and also to maintain the existing capital. In contrary, scarcity of financial resources forces LDC's to launch new projects at the minimum possible cost which leads to the lowest quality. Also shortage of funds deters LDC's from maintaining the existing investments properly.

While depreciation is usually envisaged only for physical capital and infrastructures, other forms of depreciation on human, social, and natural capital are worth to study. For instance, mortality and migration reduces the accumulated level of human capital. Also, unemployment of skilled workers is another example of the depreciation of human capital.

Moreover, the lower quality of education would increase the number of repeaters which is another indication of higher rate of human capital depreciation. Crime and corruption lead to lower social capital level and can been considered as proxies for depreciation. Furthermore, the extraction of natural resources, in particular the non-renewable ones, begets depletion of resources which can be seen as natural capital depreciation.

Pollution is another example of natural capital depreciation which reduces the welfare of the next generations. This is extensively explored in the concept of sustainable development. Scholars of sustainable development argue that modern growth theories are time inconsistent for neglecting environmental damages caused by reckless growth. In other words, enhancing the welfare of today's generation can lead to lower welfare in the future. We believe the inclusion of the determinants of depreciation rate in growth theories is a justified response to the above criticism.

III. Background

In this study a comprehensive, integrated Indicator for depreciation is provided using fuzzy methods similar to how measuring "economic sustainability" in the literature of "sustainable development." This paper can be seen as an attempt to align the theories of modern growth economics and sustainable development via emphasizing the role of depreciation rate in the theory of growth.

In the literature of sustainable development, fuzzy methods are extensively used; for instance, Yannis et. al (2004) Cornelissen et. al (2001) Mendoza & Prabhu (2003) Phillis & Andriantiatsaholiniaina Prato (2005).

Nowadays, fuzzy methods are used for calculation of Indicators. In the fuzzy approach, first, numerical variables are transformed into linguistic variables with different membership intensities. Then the fuzzy logic operators in the framework of if-then are used to combine the variables. Here, "the minimum degree of membership" rule is employed to integrate the variables. In this method, higher depreciation rates in only one area can lead to higher level of integrated indicator, which is consistent with the theory presented in this study. The last stage is defuzzification, in which, the integrated fuzzy variables are transformed into crisp variables.

IV. Fuzzy Logic Methodology

With the advancement of data processing and artificial inelegance techniques, modern methods were developed in order to analyse fuzzy systems. To this end, many efforts have been made to simulate decision making processes taking place in the human brain.

Accordingly, fuzzy logic systems are introduced as an efficient instrument for modelling fuzzy systems with uncertainly, where other methods of system analysis proved to be ineffective. Thus fuzzy logic enables researchers to model and to control decision making process in a fuzzy, uncertain environment.

In the literature of development economics, fuzzy logic is employed to measure economic sustainability among a number of countries. Likewise in this work, fuzzy logic is exploited to shed light on the ambiguous concept of depreciation of capital. In fact, the borderline between high and low depreciation rates is not apparent and thus fuzzy. Therefore, the exact estimation of depreciation is impossible and in any measurement the fuzziness of depreciation should be considered.

V. The Theory of Fuzzy Sets

Based on fuzzy logic approach "degree of membership" (DOM) is defined over a fuzzy set taking values between zero and one. Membership in the fuzzy Set A is denoted as μ_A and defined as:

$$\mu_A: \ x \rightarrow [0\,,1] \qquad (1)$$

As $\mu_A(x)$ is getting closer to unity, DOM of x to the fuzzy set A intensifies. In contrary, if $\mu_A(x) = 0$ then it will be safe to claim that x does not belong to the fuzzy set A (Zimmermann, 1991). "Membership function" relates any point from the input space to a set of degrees of membership taking values between zero and one. A number of different types of membership function exist.

In a fuzzy set, the operators of union, intersection, and complementation are defined upon DOM as maximum, minimum, and distance from one:

$$\mu_{A\cup B(x)} = \mu_{A(x)} \vee \mu_{B(x)} = \max(\mu_{A(x)}, \mu_{B(x)}) \qquad (2)$$

$$\mu_{A\cap B(x)} = \mu_{A(x)} \wedge \mu_{B(x)} = \min(\mu_{A(x)}, \mu_{B(x)}) \qquad (3)$$

$$\mu_{\bar{A}(x)} = 1 - \mu_{A(x)} \qquad (4)$$

In the framework of fuzzy logic systems, a fuzzy rule base can be introduced to map inputs to outputs. Fuzzy rules are a set of IF-THEN rules that map the input fuzzy (linguistic) variables to output fuzzy variables.

To construct a fuzzy system, the following steps should be taken:

a) All the input and output variables are clearly defined

b) Fuzzification: all the input variables are transformed into linguistic variables with specific DOM
c) Define fuzzy rule base as a set of IF-THEN rules.
d) Combine the linguistic variables based on the relevant IF-THEN rule.
e) Combine fuzzy Indicators towards an integrated Indicator
f) Defuzzification: transforming the Indicators from linguistic values to crisp value. Here, we use "center of gravity" method.

In designing a fuzzy logic system, selection of "membership function" (MFs) to fuzzify the crisp variables is a crucial step. There exist a number of different MFs with different forms and complexity. Here, we select "Gaussian MF", which is continuous and derivable. Also, the 5-step linguistic variables are used that can take any value of Very High (VH), High (H), Neutral (A), Low (L), and Very Low (VL).

To normalize the data, the range of variation of each variable is considered between the maximum and minimum values in our sample. Also to reduce the impact on outliers in the model, all the variables are averaged over the three years 2006-2009.

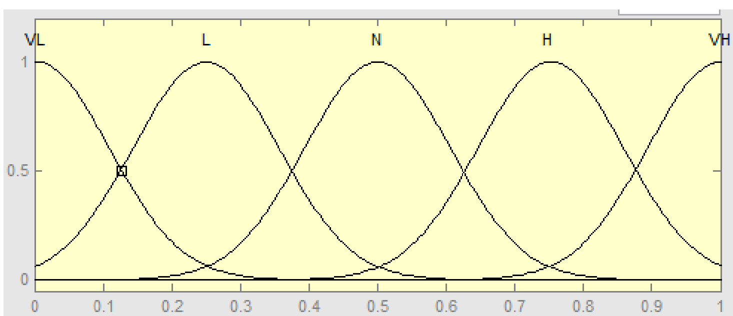


Figure 1: Gaussian five-step linguistic variables

The Mamdani rules used in this paper presented in Table1. As it shown, to combine two fuzzy variables always the weakest variable dominates. For instance, suppose we would like to combine two fuzzy variables of "unemployment with tertiary education" and "total repeaters, secondary" with values of VH and VL in order to create the fuzzy Indicator of educational capital depreciation. The two values indicate that the educational system performs satisfactory with very low level of repeaters; however, eventually the products of the education system remain idle; very high level of unemployment among educated people. In such circumstance, the final result of the education system is wasted and very high level of education capital depreciation is assumed.

		X$_1$				
		VH	***H***	***A***	***L***	***VL***
X$_2$	***VH***	*VH*	*VH*	*VH*	*VH*	*VH*
	H	*VH*	*H*	*H*	*H*	*H*
	A	*VH*	*H*	*A*	*A*	*A*
	L	*VH*	*H*	*A*	*L*	*L*
	VL	*VH*	*H*	*A*	*L*	*VL*

Table 1: Fuzzy rule base

VI. Fuzzy Logic System for Depreciation

In our work, ten economic variables of 21 developing countries are integrated in a fuzzy logic system in order to provide integrated depreciation Indicator for each country. First, depreciation Indicators are calculated in four areas of human, social, physical and natural capital. The comprehensive deprecation Indicator is provided for each country through integration of the four above-mentioned Indicators. All Indicators take values between zero and one. The bigger Indicator reflects the higher depreciation level.

In Figure (2), all the ten indicative variables and their combination towards comprehensive integrated Indicator are illustrated. The Indicator of "human capital depreciation" (HUM) is a result of integration of two Indicators of "education Indicator" (EDU) and "headcount Indicator." "Educational capital depreciation" is a result of combination of two variables: "unemployment with tertiary education (% of total unemployment)" and "total repeaters, secondary, (% of total enrolment)." In other words, in a country with high number of repeaters and high unemployment rate of educated people, human capital is wasted rapidly.

Two variables of "net migration" and "life expectancy" are selected as proxies for "headcount Indicator." Accordingly, with a negative "net migration rate" and short "life expectancy," the "headcount Indicator" increases towards one.

The Indicator of "social capital depreciation" (SOC) is introduced through combination of two variables of "corruption perception Indicator" and "homicides per 100,000 people." "Corruption perception Indicator" is defined inversely, that is higher value of Indicator indicates lower level of corruption. On the other hand, higher homicide rate exacerbates social capital in the society. As a result, "social capital depreciation" is at its peak in a country with lower value of "corruption perception Indicator" and higher homicide rate.

"Value lost due to electrical outages" and "vehicles per KM of road" are two of few variables available on the World Bank database that can explain the level of physical (infrastructure) capital depreciation (PHY) in a country. Higher depreciation rates of physical capital is expected with the higher levels of these two variables. Similarly, “natural capital depreciation” (NAT) Indicator is directly related to two variables of “particle damage” and “total natural resources rents (% of GDP).”

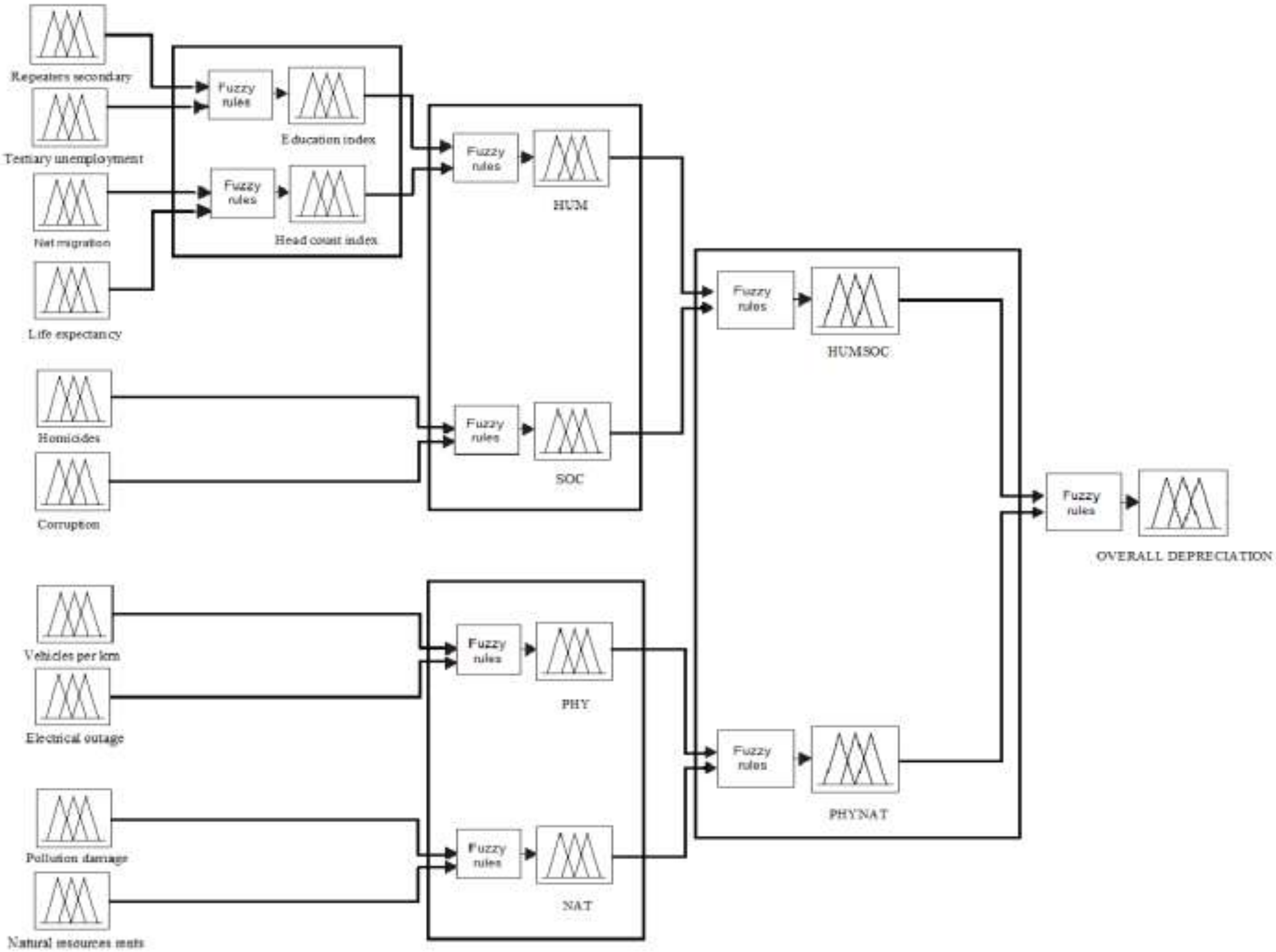
To calculate the “comprehensive integrated depreciation Indicator,” first, two Indicators of HUM and SOC are combined to make the Indicator of HUMSOC. Likewise the PHYNAT Indicator is a result of combining PHY and NAT Indicators.

All data are extracted from the “World Development Indicators” database of World Bank. (Appendix 2) The 10 economic variables are normalized and fuzzified into five-state linguistic variables with different DOMs, suing Fuzzy Logic Toolkit of MATLAB. Then with combining these linguistic variables and defuzzification, four basic depreciation Indicators and one integrated depreciation Indicator are calculated.

It is noteworthy that many variables can represent different types of depreciation; however, selection of the 10 variables is not because they are more eligible, rather because of the data availability. As a matter of fact, international institutions’ focus for data gathering has never been depreciation or the outflow of capital. It is expected that in the future more attention is paid to the concepts depreciation, quality, and the longevity of capital in data gathering.

The effectiveness of a fuzzy logic model depends upon how independent the input variables are. In other words, high correlation between two variables (close to unity) decreases the power of model. In Table 1 reports the pair correlations between the 10 variables and approves the independence of all the variables.

Figure 2: Flowchart of the fuzzy combination of variables



VII. Estimates of depreciation Indicators

Results of fuzzy estimation of deprecation Indicators for a peer group of developing countries are illustrated in Figure 3 and Appendix 2. In Figure 3, all the Indicators are sorted out based on the rank of each country in comprehensive integrated depreciation Indicator. Points closer to center show lower depreciation and points farther from the center show higher values. Minimum and maximum possible values are zero and one.

Two features are considered to select the countries for this research: (1) they are among middle-income developing countries; (2) all the 10 variables were available. Selected countries are as follows: Armenia, Azerbaijan, Bosnia & Herzegovina, Bulgaria, Chile, Croatia, Czech Republic, Estonia, Hungry, Kyrgyz Republic, Latvia, Lithuania, Malaysia, Panama, Poland, Romania, Russian Federation, Slovak Rep., Slovenia, Turkey, Ukraine.

Our investigation shows that most of the countries in this study benefit from low educational capital depreciation rate except Chile and Panama. For this Indicator, Armenia and Ukraine present the lowest value of 0.103, whereas Chile is at the top of the list at 0.592.

Lowest Headcount Indicator goes to Czech Republic (0.237). In our sample Czech Republic has very high life expectancy and favourable net migration rate. In contrary, Kyrgyz Republic suffers from low life expectancy and negative net migration rate. Headcount depreciation Indicator for this country is as high as 0.881. Headcount Indicator indicates suitable situation for European and Latin American developing countries such as Slovenia, Slovak Republic and Chile. Malaysia enjoys relatively good situation; however, CIS countries are in critical situation.

Human capital depreciation Indicator (HUM) is a result of combination of two Indicators of Educational and Headcount. In our sample, HUM ranges from 0.277 to 0.782. Czech Republic with favourable situation in both contributing Indicators benefits from low HUM level. Slovenia is another country with low HUM mainly due to low headcount Indicator. In contrast, CIS countries show very high level of HUM depreciation.

Highest SOC depreciation Indicators belong to Kirgiz Republic (0.883) and Russian Federation (0.882), closely following by other CIS countries such as Azerbaijan, Armenia, and Ukraine. On the other hand Slovenia's SOC Indicator is at the lowest level of 0.156. This country benefits from Very low level of corruption and homicide rates. Malaysia, Czech Republic Hungry, Estonia, and Slovak Republic come after Slovenia.

HUMSOC Indicator is generated by integration of two depreciation Indicators of HUM and SOC and allocated in a range between 0.298 and 0.784. The minimum measure belongs to Slovenia and maximum goes to Kyrgyz Republic and Russian Federation. CIS countries' miserable situation in HUMSOC Indicator is due to high level depreciation of both HUM and SOC Indicators.

Among the countries under investigation, Estonia presents the best level of physical depreciation Indicator (PHY) at 0.0937; and follows by Hungry (0.253), Latvia (0.259), Lithuania (0.256), and Azerbaijan (0.256). Kyrgyz Republic (0.895), Malaysia (0.853) and Bulgaria (0.741) are at the highest level of physical capital depreciation.

Since most of the countries in this research obtain little access to natural resources such as oil and gas, in many of these countries natural capital depreciation Indicator (NAT) shows low values. This Indicator for the three countries of Czech Republic, Panama, Slovak Republic, and Slovenia is as low as 0.11. The Indicator jumps to highest level of 0.914 and 0.875 for Azerbaijan and Armenia.

Combination of PHY and NAT provides the Indicator of PHYNAT which is at its lowest level for Estonia and Hungry at 0.11 and highest level for Azerbaijan at 0.812.

At this stage, we calculate the comprehensive, integrated depreciation Indicator through combining two Indicators of HUMSOC and PHYNAT. The results present the lowest depreciation Indicator for Slovenia at 0.316 and the highest for Azerbaijan at (0.745). Two cases of Estonia and Hungry are worth to be mentioned. The two countries enjoy low level of PHYNAT Indicator; nonetheless, the comprehensive Indicator is relatively higher for them due to higher HUMSOC Indicators.

In our analysis, no country obtains very high (VH: 0.80-1.00) or very low (VL: 0.00-0.20) comprehensive depreciation Indicator. This is consistent with the fact that our sample covers only a peer group of developing countries and rich and poor countries are excluded. Only one country, Slovenia (0.316), enjoys low depreciation Indicator (L: 0.20-0.40). Other developing European countries, such as Slovak Republic, Estonia, Hungry, Czech Republic, Turkey, and Latvia capital depreciation is in the middle or normal (N: 0.40-0.60). Depreciation Indicators are at high level (H: 0.60-0.80) for CIS countries such as Azerbaijan, Kyrgyz Republic, Russia, Armenia, Ukraine, and Lithuania, as well as other developing countries, namely, Malaysia, Bosnia & Herzegovina, Panama, Bulgaria, Poland, Chile, Romania, and Croatia.

As the following graph demonstrates, in fuzzy logic system, by combining the fuzzy variables the range of the resulting Indicator shrinks; for instance, the range of the comprehensive depreciation Indicator is more limited than PHYNAT and HUMSOC Indicators.

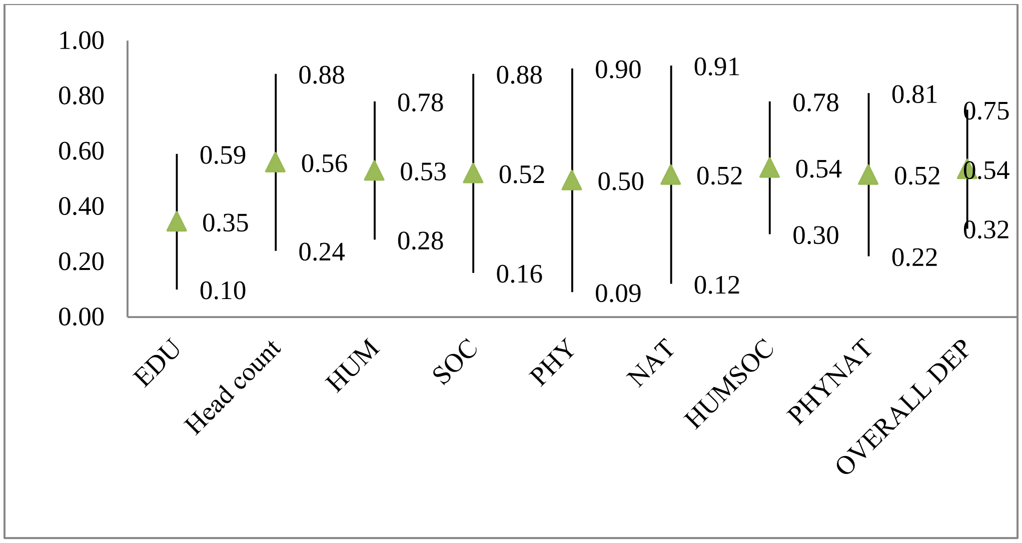


Figure 3: The range of variations for each type of depreciation Indicators

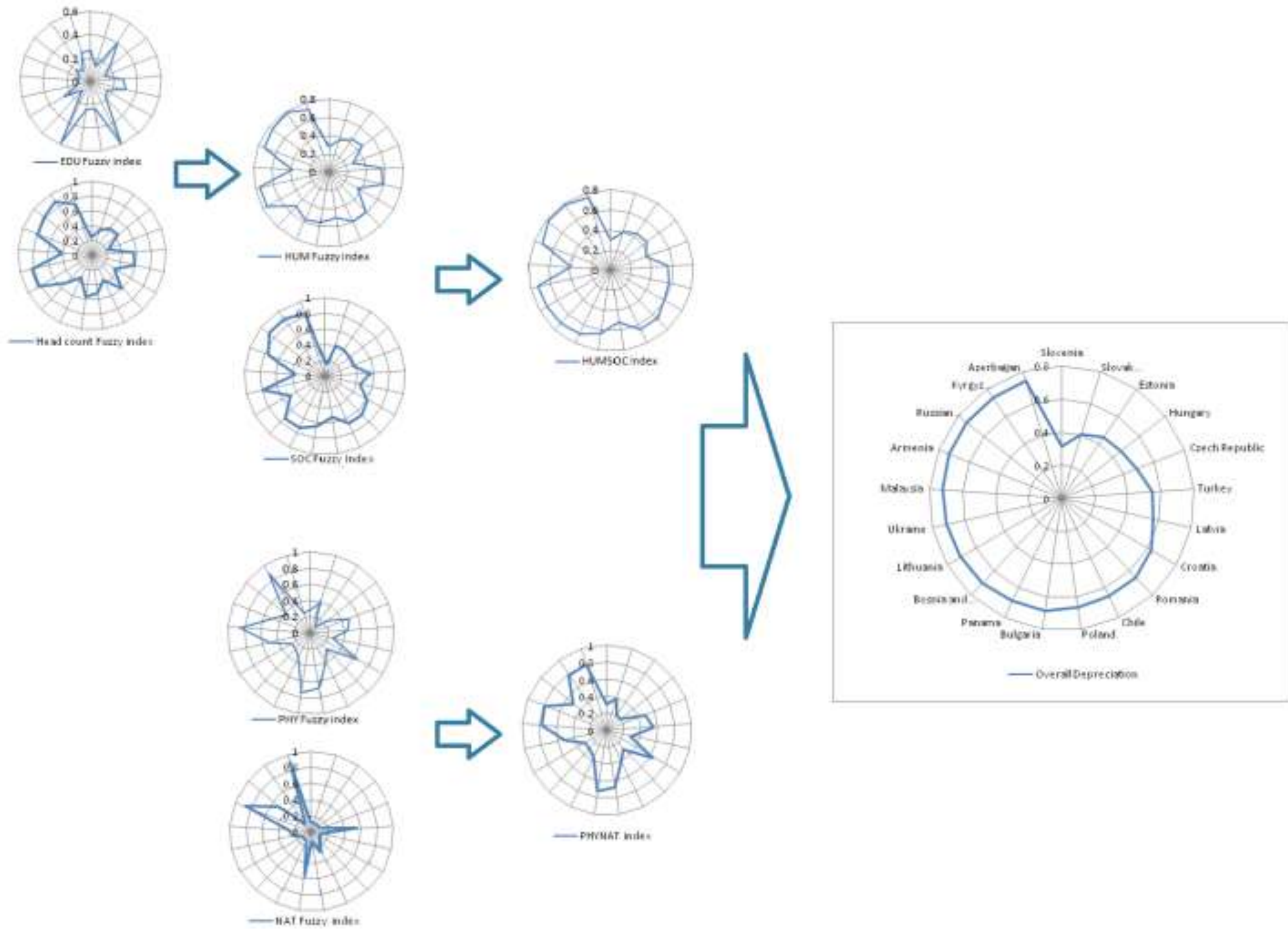


Figure 4: Figurative illustrations of depreciation Indicators for 21 developing countries

Source: authors' calculation using Fuzzy Logic Toolkit—MATLAB on data from "World Development Indicators"-- World Bank

VIII. Concluding Remarks

This research is a step towards recognition of the role of capital depreciation in empirical studies of growth and development. We provide human, social, physical and natural capital depreciation Indicators along with integrated depreciation Indicator for 21 developing countries. Further research is recommended to expand the coverage of this study to other countries and also to add new relevant variables to the proposed model. It is recommended that the institutions responsible for data gathering such as World Bank go beyond collecting only data related to capital accumulation towards data related to capital depreciation.

Our fuzzy model indicates that most of the countries under study present high level of depreciation; however, there exists some countries such as Slovenia which enjoy low depreciation rate.

It is worth noting that a kind of regional convergence is observed in depreciation Indicators. For instance, both Latin American countries in our dataset reflected higher level of depreciation of educational capital, whereas the lowest Indicators of head count human capital belong to developing European countries. Moreover, CIS countries suffer from high depreciation in the areas of natural and social capital.

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Appendix I: Database

	Human Capital				Social Capital		Physical Capital & Infrastructures		Natural Resources	
	Educational		Head Count							
	Repeated Secondary	**Tertiary Unemployment**	**Net Migration/ Ave Pop.**	**Life Expectancy**	**Homicides**	**Corruption Perception**	**Vehicle per KM of Road**	**Electrical Outages losses**	**Particles Damages**	**Natural Resources Rents**
Armenia	0.00	13.00	-0.024	73.50	2.33	2.93	42.00	1.80	1.75	1.00
Azerbaijan	1.00	14.00	-0.006	70.00	2.00	2.15	13.00	1.80	0.00	60.75
Bosnia & Herzegovina	0.00	4.00	-0.003	75.00	2.00	3.08	23.00	1.90	0.00	1.75
Bulgaria	2.00	10.00	-0.007	73.00	2.00	3.88	67.00	1.40	1.00	2.00
Chile	3.33	24.67	0.002	78.75	11.33	6.98	36.00	1.80	0.00	20.75
Croatia	0.33	11.25	0.002	76.00	1.67	4.00	57.67	0.80	0.00	1.75
Czech Rep.	1.00	4.50	0.022	77.00	2.00	5.03	41.00	0.60	0.00	0.00
Estonia	4.00	18.00	0.000	73.75	6.67	6.60	10.50	0.50	0.00	1.00
Hungary	3.00	8.00	0.007	73.50	1.67	5.18	20.00	0.90	0.00	1.00
Kyrgyz Rep.	0.00	10.00	-0.014	67.25	8.00	2.10	9.00	10.50	0.00	1.00
Latvia	4.33	14.00	-0.004	71.75	4.67	4.75	14.67	1.10	0.00	1.25
Lithuania	1.00	14.50	-0.030	71.75	8.33	4.78	22.50	0.70	0.00	1.00
Malaysia	0.00	25.00	0.005	74.25	2.00	4.93	83.00	3.00	0.00	16.75
Panama	5.00	25.00	0.003	75.75	11.00	3.28	30.00	2.40	0.00	0.00
Poland	2.33	9.50	-0.003	75.50	1.00	4.38	57.50	1.90	0.00	1.00
Romania	2.00	6.50	-0.009	72.75	2.00	3.60	24.00	2.20	0.00	3.00
Russian Fed.	0.33	32.00	0.002	67.75	16.33	2.33	35.00	1.20	0.00	28.50
Slovak Rep.	1.67	4.50	0.004	74.50	2.00	4.78	35.00	0.30	0.00	0.00
Slovenia	1.00	12.50	0.011	78.75	1.00	6.58	28.67	0.50	0.00	0.00
Turkey	5.00	12.50	-0.001	72.00	3.33	4.23	24.00	2.80	1.00	0.00
Ukraine	0.00	39.00	-0.002	68.25	5.67	2.65	40.00	4.40	0.00	4.75
Max	5.00	39.00	0.02	78.75	16.33	6.98	83.00	10.50	1.75	60.75
Min	0.00	4.00	-0.03	67.25	1.00	2.10	9.00	0.30	0.00	0.00

Appendix II: Fuzzy Indicators of Depreciation in 22 developing countries

	EDUCATIONAL	Head Count	HUMAN	SOCIAL	HUMSOC	PHYSICAL	NATURAL	PHYNAT	Overall Depreciation
Armenia	0.103	0.783	0.732	0.755	0.725	0.502	0.875	0.778	0.733
Azerbaijan	0.262	0.727	0.711	0.835	0.754	0.264	0.914	0.812	0.745
Bosnia & Herzegovina	0.0976	0.504	0.504	0.738	0.717	0.266	0.125	0.295	0.705
Bulgaria	0.246	0.559	0.552	0.633	0.63	0.741	0.568	0.716	0.691
Chile	0.592	0.363	0.592	0.661	0.658	0.401	0.283	0.407	0.656
Croatia	0.157	0.351	0.352	0.599	0.593	0.643	0.125	0.632	0.628
Czech Rep.	0.128	0.237	0.277	0.367	0.369	0.491	0.116	0.49	0.488
Estonia	0.397	0.439	0.438	0.397	0.438	0.0937	0.117	0.215	0.445
Hungary	0.207	0.459	0.454	0.387	0.451	0.253	0.117	0.215	0.457
Kyrgyz Rep.	0.113	0.881	0.782	0.883	0.784	0.895	0.117	0.788	0.737
Latvia	0.307	0.592	0.584	0.443	0.576	0.259	0.119	0.289	0.568
Lithuania	0.262	0.83	0.752	0.493	0.723	0.264	0.117	0.292	0.708
Malaysia	0.111	0.387	0.392	0.369	0.392	0.853	0.282	0.763	0.723
Panama	0.582	0.321	0.574	0.724	0.706	0.327	0.116	0.34	0.692
Poland	0.239	0.503	0.503	0.522	0.519	0.685	0.117	0.668	0.666
Romania	0.18	0.596	0.589	0.659	0.657	0.275	0.153	0.294	0.655
Russian Fed.	0.157	0.822	0.749	0.882	0.783	0.371	0.499	0.499	0.735
Slovak Rep.	0.14	0.362	0.364	0.402	0.402	0.389	0.116	0.392	0.405
Slovenia	0.262	0.241	0.281	0.156	0.298	0.295	0.116	0.314	0.316
Turkey	0.274	0.569	0.561	0.558	0.553	0.438	0.564	0.556	0.549
Ukraine	0.103	0.821	0.748	0.789	0.737	0.505	0.242	0.504	0.716

Max	0.592	0.881	0.782	0.883	0.784	0.895	0.914	0.812	0.745
Min	0.0976	0.237	0.277	0.156	0.298	0.0937	0.116	0.215	0.316