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**IDENTIFICATION OF IMPACTING FACTORS OF SOCIO-ECONOMIC  
ACTIVITY OF CHINA ON HUMAN DEVELOPMENT USING  
ECONOMETRICS MODELING**

***Аннотация:** Статья посвящена оценке показателей социально-экономической активности, таких как ожидаемая продолжительность жизни, валовой национальный доход (ВНД) на душу населения, средние годы обучения человека. В статье при помощи эконометрического моделирования приводятся доказательства влияния данных показателей на развитие человека в Китае, выраженное через индекс человеческого развития (ИЧР). Статья основана на эмпирических данных 1990 - 2015 годов.*

***Ключевые слова:** Китай, эконометрическое моделирование, человеческое развитие, экономический рост.*

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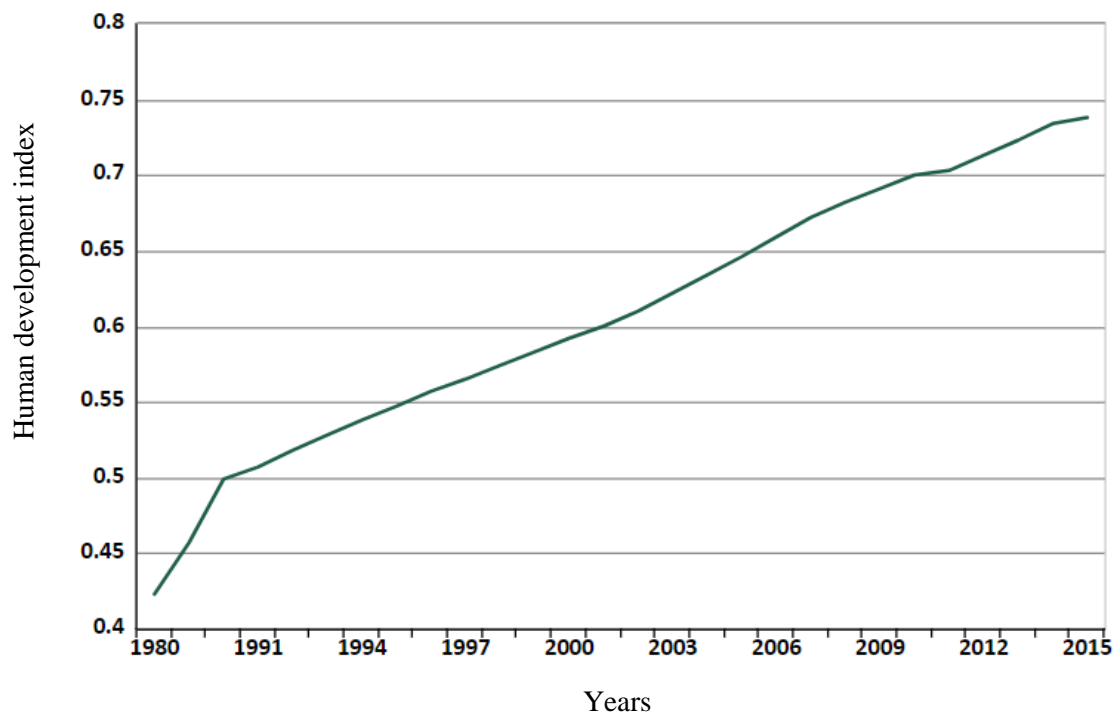
**Annotation:** *The article is dedicated to the evaluation of indicators of socio-economic activity, such as life expectancy at birth, gross national income (GNI) per capita, mean years of schooling and their influence on the human development of China represented by the Human development index (HDI). The article is based on the empirical data of 1990 – 2015 years.*

**Keywords:** *China, econometric modelling, human development, economic growth.*

The Human Development Index was developed in 1990 and it is a major strategic tool of the concept of human development [6]. It is an aggregate measure of the level of human development in a country, so in some cases it is used as a synonym for terms such as “quality of life” or “living standard”.

The HDI is calculated annually for intercountry comparison and measurement of living standards, literacy, education and longevity as the main characteristics of the human potential and development [2]. The index is published in the framework of the United Nations Development Program in the annual reports on human development.

China represents a group of countries with a high level of human development. Among the BRICS countries, China has the best health indicators, such as life expectancy and mortality [5]. As it can be concluded from the Picture 1, China's policy is inseparably linked with the concepts of stimulating growth of health services, education, basic social security, preventing the decline in economic growth.



**Picture 1.** Human development index in China for the period 1980 – 2015

In order to reveal which factors are more reliable for identification of the human development index the econometric model was created.

When calculating the HDI, three types of indicators are taken into account [1]:

- Life expectancy - estimates longevity;

- The level of literacy of the country's population (the average number of years spent on training) expressed as mean years of schooling;
- The standard of living, estimated through GNI per capita at purchasing power parity (PPP) in US dollars.

Hereinafter we will use the following notation:

D - the endogenous variable - Human development index (HDI);

L - the exogenous variable - Life expectancy at birth (years);

G - the exogenous variable - Gross national income (GNI) per capita PPP (current international \$);

S - the exogenous variable - Mean years of schooling (years).

Thus, the specification of the econometric model will take the following form:

$$\begin{cases} D_t = a_0 + a_1 * L_t + a_2 * G_t + a_3 * S_t + u_t \\ E(u_t | L_t, G_t, S_t) = 0 \\ E(u_t^2 | L_t, G_t, S_t) = \sigma_t^2 \end{cases} \quad (1)$$

Using the statistical method of least squares using the LINEST Excel function, we obtained the following equation for the econometric model:

$$D_t = -0,73 + 0,02 * L_t + 0,01 * G_t + 0,02 * S_t + u_t \quad (2)$$

$(S_{a_0} \sim = 0,15)(S_{a_1} \sim = 0,01)(S_{a_2} \sim = 0,01)(S_{a_3} \sim = 0,01)(S_{a_4} \sim = 0,01)(\sigma_u \sim = 0,01)$

where the quantities  $S_{a_0} \sim, S_{a_1} \sim, \dots, S_{a_4} \sim$  are the standard error of estimating the parameters  $a_0, \dots, a_3$ .

The strong correlation between endogenous and exogenous variables is described with high coefficient of determination  $R^2$  value = 0,996. It means that approximately 99,6% of variances of actual endogenous variables' variances were explained by the model, which is a very good and accurate result.

In order to evaluate adequacy of model's specification F-test was taken. According to the regression analysis  $F = 2045$ ,  $F_{cr} = 3,44$ .  $F > F_{cr}$  shows that the specification may be counted as adequate.

In order to check disturbance terms for homoscedasticity in regression analyses the Goldfeld–Quandt test was made [3]. Firstly, variables were divided into two groups according to their sum of absolute values of regressors. Then the regression analysis was made for both groups. The regression analysis showed that  $RSS_1 = 0,015$ ,  $RSS_2 = 0,016$ . Now we can calculate the index of Goldfeld–Quandt, using the formula:

$$GQ = \frac{RSS_1}{RSS_2} = 0,97; GQ^{-1} = \frac{RSS_2}{RSS_1} = 1,03 \quad (3)$$

Both indexes are lower than  $F_{cr} = 3,18$ . From the Goldfeld–Quandt test we can conclude that residuals of the model are homoscedastic, i.e. increase in exogeneous variables does not cause an increase in residuals [4].

In order to detect the presence of autocorrelation in the residuals, Durbin-Watson test was made. Using the Excel calculations we got  $DW = 0,63$ . The boundaries of intervals of critical values  $d_l$  and  $d_u$ , using significance level = 0.05, relatively are 1,14 and 1,65. Thus, we may say that there is autocorrelation in the residuals. Autocorrelation of residuals may appear due to many factors, typically they are:

- 1) Incorrectly selected nature of equation;
- 2) An extra regressor is added into the equation;
- 3) A significant explanatory model is missed.

In addition to the previous tests of verifying the effectiveness of the selected model and specification, it is also advisable to check whether a particular regressor is significant in the model. For this, it is necessary to calculate the ratio of the regression parameter estimation module to its error. If this ratio is greater than  $t_{crit}$ , then the regressor is significant in the model. According to the regression analysis  $t_{crit}$  (significance

level=0,001; degrees of freedom = 22) = 3,79. As it can be concluded from the Table 1, all chosen regressors are significant in the econometric model.

Table 1. Coefficients' analysis

	<i>Coefficients</i>	<i>t Stat</i>
	-	
Intercept	0,732745843	-5,040742395
Life expectancy at birth (years)	0,01627455	6,645673042
Gross national income (GNI) per capita PPP (current international \$)	5,11141E-06	6,22972542
Mean years of schooling (years)	0,022066937	4,172063054

To sum up, the analysis performed shows a significant impact of life expectancy at birth, gross national income (GNI) per capita, mean years of schooling on the human development index of China. However, according to the Durbin-Watson test, some more significant explanatory variables should be added to the model. They can be living standards, literacy, education and longevity, as they are the main characteristics of the human potential and development. Accessibility and equity in basic public services is one of the important conditions for maintaining sustainable economic growth and continued economic and social prosperity in China.

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