

Analysis of Factors Affecting the Development of Online Education under COVID-19: Evidence from Chinese “Double Reduction” Policy

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Abstract. With the further spread of the new crown epidemic and the enactment of the "double reduction" policy in 2021, the online education market is challenged by ice and fire. This paper collects data on the size of the online education market and related influencing factors, and introduces multiple linear regression analysis for comparative analysis. I found that is effective in estimating the online education market in the new environment, with significantly higher model accuracy. This has important implications for how to develop a quality online education market, which in turn has significant practical implications for the country's response to the epidemic affecting offline education, meeting people's educational needs, and improving the education system.

Keywords: Covid-19; Online Education; Multiple Linear Regression; “Double Reduction” Policy.

1. Introduction

The emergence of the World Wide Web as a powerful catalyst in 1991 led to the rapid expansion and development of online education, and since then, universities in the United States and around the world have been offering online courses (wallace, 2003), and Internet technologies are increasingly being used in education, and this phase of educational paradigm change is mainly the result of the upgrading of educational technologies.

In 2019, online education was further promoted. 2019 ended with the emergence of HCoV, which Catharine I. Paules (2020) identified as a new acute respiratory infection of the beta genus coronavirus, the third coronavirus with a high lethality rate to emerge since the 21st century. The novel coronavirus spread from Wuhan to the whole China and the world within 30 days, indicating its wide and rapid spread. In an effort to contain the rapid spread of Covid-19 and maintain social distance, schools around the world have closed and shifted their teaching activities to distance learning platforms (Ribeiro, 2020). China's Ministry of Education has also issued a call for "stopping classes without stopping school" to encourage schools and universities to arrange multiple forms of teaching and learning activities via the Internet. The sudden increase in the size of the online education market has also led the author to identify a serious problem with the uneven quality of online education.

According to Lee (2010), online education is a form of education facilitated by social learning and information technology that allows communication between instructors and students through ordinary interaction, but most online instructors/scholars have little experience in many subjects, similar to students. Thus during the COVID-19 pandemic, it was unclear how effective the college's education mostly online for distance learning would be before the pandemic forced the university to convert its courses to online delivery overnight (Liguori & Winkler, 2020). Overall, the pandemic forced more and more teachers to use online teaching methods and students were forced to adapt to the online format when the effectiveness of online education was unknown.

In addition, in July 2021, the central government issued the "Opinions on Further Reducing the Burden of Homework and Off-Campus Training for Students in Compulsory Education", which brought a certain impact on the development of online education. "The first opinion is that the capitalization of the online education industry is strictly forbidden, and no subject-based training institution may be listed for financing, especially foreign-owned management. The second opinion is the establishment of training content filing and supervision system, in accordance with the law to resolutely investigate and deal with over the scope of training, training quality of good and bad, vulgar content illegal, piracy and other outstanding issues. The lack of a regulatory system objectively

condones the intrusive and disruptive behavior of online education institutions. Both of these items point directly to the online education market, and the government has made a decision to severely rectify the situation, leading to a cold winter in the online education market.

In terms of implementation, the government's policy preference in promoting "load reduction" in compulsory education relies excessively on mandatory means such as regulations and orders, and such a preference obviously lacks consideration of policy environment differences and other influencing factors, which can regulate school education activities and out-of-school training activities as soon as possible in the short term, but is prone to. Although in the short term, it is possible to regulate school education activities and out-of-school training activities as soon as possible, but it is prone to the phenomenon of "symbolic implementation" and "copied implementation", which eventually leads to a serious deviation from the purpose of the double reduction policy, namely to reshape the education ecology and achieve high-quality education development.

Therefore, this paper examines the factors of online education development in such a special external environment, in order to essentially analyze the internal logic of online education development, and how to use this logic to improve the adaptability to the epidemic and the "double reduction" policy.

In this paper, we use regression analysis, which is an analytical method that uses statistical principles to process a large amount of statistical data, determine the correlation between the dependent variable and certain independent variables, establish a regression equation with good correlation, and extrapolate it to predict future changes in the dependent variable. The specific application of the model in the text is to use the spss software to analyze the factors that have a close linear relationship with the development of online education through stepwise regression, and to compare the difference between the estimated and actual values of the online education market model based on the model obtained, and to make a line graph of the two. The results of the validation are applied to improve the development of online education in China.

This paper focuses on selecting and quantifying the factors that affect the size of the online education market, and then conducting stepwise correlation analysis and regression on the selected factors to finally obtain a most effective regression equation. The remainder of this paper is structured as follows: the second part reviews the literature on research topics, research questions and research methods related to this paper; the third part introduces the research methods specifically applied to the text mainly including theoretical analysis methods, empirical analysis methods and the basis for the selection of parameters, the fourth part processes the selected data to prepare for the substitution into the model; the fifth part gives the empirical results. The fourth part processes the selected data and prepares for the substitution into the model; the fifth part gives the empirical results and makes corresponding explanations; finally, the conclusion and corresponding policy recommendations are given.

2. Literature Review

2.1 Literature Review of Research Questions

How online education will meet the double impact of the new epidemic and the "double reduction" policy has been the focus of many scholars. As of July 2020, 98.6% of learners worldwide are affected by the epidemic, representing 1.725 billion children and youth from preschool to higher education in 200 countries (United Nations, 2020). In order to prevent the further development of the epidemic, online education has become the only educational way to keep social distance. This means that 1.725 billion students will be the driving force behind the growth of online education, which will grow rapidly.

Faced with the implementation of the "double reduction" policy, various localities have taken corresponding implementation measures, such as the Beijing Education Commission officially released the latest education reform document, specifically named "Notice on Further Improving the Filing and Management of Educational Mobile Internet Applications (Draft for Comments)". The

consultation draft is aimed at primary and secondary school education APPs, including subject and non-subject categories. It also suggests that "educational mobile applications for preschool children's training should all stop running." As a result, online education has seen a cold winter after the "double reduction" policy, and on July 24, 2021, the share prices of the three major education giants listed on the New York Stock Exchange plummeted, with the combined market value of New Oriental, Gao Tou Group, and Good Future evaporating by 65.5 billion yuan (Changjiang Business News, 2021).

In summary, most of the literature has focused on the impact of the New Crown epidemic on the development of online education and the negative impact of the "double reduction" policy on online education, but not on the paradoxical development of the "double reduction" policy that has led to a decrease in fire in the face of the surge in the size of online education due to the New Crown epidemic. The contradictory development of how the winners and losers, the development of a more complete online education market is the development of China's education system is a top priority. The author believes that, from the root, the factors affecting the development of online education need to be analyzed in detail, to measure the importance of their impact on the development of online education, the government can be more targeted to remedy the online education market, improve China's trading system, and train more well-rounded talent.

2.2 Literature Review of Research Methods

Online learning is the educational use of technological devices, tools, and the Internet (Means et al., 2009), and Tallent-Runnels et al. (2006) add that technological innovation and the continued growth of Internet accessibility since the turn of the millennium have increased the momentum for online learning. But D. Yates (personal communication, March 17, 2020), in a question posed in Research Gate about the impact of Covid-19 and online learning on teachers and teaching, said that students with poor technological equipment may find it difficult to meet some of the technological requirements of online learning, and that innovative use of information technology for teaching and learning on a large scale appears to be more difficult. In addition, professors and students face a wide range of logistical, technical, financial, and social issues (Lassoued, Alhendawi, & Bashitialshaer, 2020; Peters et al.). Fishbane and Tomer (2020) add that as community poverty increases, Internet access rates decline rapidly, and as a result, students with no or low socioeconomic means to afford broadband connectivity are most likely to fall behind or experience additional challenges.

After the prevalence of the new coronavirus, most education scholars in various countries have devoted themselves to research on the development of online education, such as research on the influencing factors of online education, but scholars have focused their research more on a specific influencing factor and have not aggregated the most influential influencing elements. This paper summarizes the factors that have the greatest impact on the online education market through literature analysis, and selects the most influencing factors from a macroscopic and comprehensive perspective to provide improving the quality of online education by providing a focus.

Multilinear regression is a regression model with one dependent variable and more than one independent variables. this regression analysis is worked to determine the correlations two or more variables having cause-effect relations, and to make prediction for the topic by using the relation (Gulden & Nese, 2013). Thus, some scholars utilise the model to describe the relationship of the dependent variable development of online education and its independent variables.

Aristovnik (2016) conducted a survey among students of public administration courses at the Faculty of Public Administration of the University of Ljubljana using multiple linear regression. Perceived usefulness was used as a response (dependent) variable and 12 other e-course aspects were used as predictor (independent) variables. The empirical results showed that the overall impression of the e-courses, their consistency with face-to-face instruction, and the responsiveness of the instructor had a significant impact on the students' perceived usefulness.

However, the existing literature on the analysis of online education impact factors mostly stays at the level of qualitative analysis, and less literature uses economic models to evaluate the impact factors. In this paper, we choose the multiple linear regression model in economics to conduct

regression analysis on the influencing factors of online education, and fit the influencing factors that are most closely related to the development of online education market, which is conducive to promoting the development of online education market in China more effectively.

The above illustrates the rationality of using multiple linear regression for the influencing factors of online education market, while the selection of factors such as information technology and the degree of economic development are also necessary factors.

3. Methodology

3.1 Research Methods

(1) Internet information collection method. By browsing the website of National Bureau of Statistics and the website of Ariadne Consulting Centre, collecting the data related to the market size of online education and its influencing factors from 2008 to 2021.

(2) Literature research method. This paper collects domestic and foreign literature about the development of online education through search tools, proposes the method of estimating acidity of effective online education market size - regression analysis method, makes the model of relevant methods and applies it in the actual case.

(3) Quantitative analysis and qualitative analysis. This paper adopts qualitative research through the study of domestic and foreign literature on emerging coronavirus, "double reduction" policy, and the application of multiple linear regression research procedures; in the empirical analysis, we use SPSS to establish parametric regression models, estimation and testing, and adopt quantitative analysis.

(4) Empirical analysis method. This paper collects data related to the market size of online education and its influencing factors from 2008-2021 on the website of National Bureau of Statistics and the website of Avery Consulting Centre, and then confirms the reasonableness of the application of parametric regression analysis method through SPSS estimation and testing.

3.2 Parameter Selection and Processing

The explanatory variables are the number of school students per 100,000 population, gross national income, financial education expenditure, market size of China's IDC industry, Internet penetration rate, research and experimental development expenditure, and total book printings, which are selected as factors affecting the market size of online education. The number of students per 100,000 population is chosen, among which the number of full-time students in general higher education, secondary education and primary education is chosen; students in vocational schools and other schools are included in this paper mainly because their education mode is very different from that of ordinary full-time schools and there is uncertainty about whether online education is adopted during the epidemic. The Ministry of Finance has also increased its investment in education funding. The reason for choosing the size of the IDC industry as one of the data is that, as one of the hottest industries in the new era, IDC technology provides the most necessary "software" elements for building online education platforms. The IDC industry, or Internet Data Center, refers to a service platform with complete equipment (including but not limited to high-speed Internet access bandwidth, safe and reliable server room environment, etc.), professional management, and perfect applications. The development of IDC industry can bring better automation management technology, large scale data analysis and processing capability, and data preservation capability to the online education industry. The renewal of facilities and equipment is the most important way to bring significant improvements to the user experience of online education. In addition, the Internet penetration rate and the total number of books printed reflect the level of social acceptance of the Internet. All these elements have a direct impact on the size of the online education market.

This paper mainly collects data on the size of the online education market and its influencing factors from 2008-2021, and the actual values are taken for the numerical entry. In order to ensure the continuity of the article regression analysis, the data collected in this paper are for each year. To

ensure the consistency, accuracy and authority of the data, the original data collected by the author are mainly from the website of National Bureau of Statistics and Avery Consulting Centre.

Table 1. The number of 13 factors affecting the development of online education and the size of the online education market for 14 years

date	Online Education Market Scale/billion	Number of students in school per 100,000 population	Gross National Income (GNI)/billion	Financial education funding/billion	Market Size of China IDC Industry/billion	Internet penetration rate/%	Expenditure on research and experimental development/billion	Total number of books printed/Billions of copies
2008	352.20	2134.84560	321229.50	10449.63	48.70	22.60	4616.02	70.60
2009	414.60	2106.49667	347934.90	12231.09	72.8	28.90	5802.11	70.40
2010	491.10	2090.73007	410354.1	14670.067	102.73	34.30	7063.00	71.70
2011	575.00	2077.36953	483392.80	18586.70	171.68	38.30	8687.00	77.00
2012	700.60	2030.19885	537329	23147.57	211.89	42.10	10298.41	79.20
2013	839.70	1966.72778	588141.2	24488.22	263.86	45.80	11846.60	83.10
2014	998.00	1973.26689	644380.20	26420.582	374.13	47.90	13015.63	81.80
2015	1225.40	1993.42686	685571.20	29221.45	521.29	50.30	14169.88	86.60
2016	1560.20	2022.54964	742694.1	31396.25	718.20	53.20	15676.75	90.40
2017	1916.70	2064.47837	830945.7	34207.75	951.00	55.80	17606.13	92.40
2018	2321.20	2117.48258	915243.5	36990.00	1228.00	59.60	19677.93	100.10
2019	3133.60	2182.82853	983751.2	40046.00	1562.50	64.50	22144.00	105.98
2020	3807.40	2247.37684	1008782.50	42891.00	2238.70	70.40	24426.00	101.00
2021	3220.00	2332.53670	1133200.00	42908.15	25637.10	73.00	27956.30	99.80

Source: SPSS

First, I choose the time interval 2008-2021, and the explanatory variables are the market size of online education (Y), the average number of students in higher education per 100,000 population (X₁), the total national income (X₂), the fiscal expenditure on education (X₃), the market size of China's IDC industry (X₄), the Internet penetration rate (X₅), the expenditure on research and experimental development (X₆), and the total number of books printed (X₇). The total number of books printed (X₇).

Table 2. Descriptive analysis of 13 factors affecting the development of online education and the size of the online education market for 14 years

Descriptive Statistics						
	N	Range	Minimum	Maximum	Mean	Std. Deviation
y	14	3455.20	352.20	3807.40	1539.6929	1161.96805
x1	14	365.8089	1966.7278	2332.5367	2095.73678	104.466646
x2	14	811970.50	321229.50	1133200.00	688067.850	258298.579
x3	14	32458.5204	10449.6296	42908.1500	27689.6042	11029.6084
x4	14	25588.40	48.70	25637.10	2435.8986	6709.03974
x5	14	50.40	22.60	73.00	49.0500	15.04535
x6	14	23340.28	4616.02	27956.30	14498.9829	7153.93632
x7	14	35.58	70.40	105.98	86.4343	12.12052
Valid N (listwise)	14					

Source: SPSS

According to the table above, we can see that all 6 independent variables are increasing in value over time; it is worth noting that the dependent variable online education market size is growing until 2021, but in 2021, there is a decreasing trend; the total number of books printed also shows a decreasing trend from 2020. According to the maximum and minimum statistics we can see that the most significant increase in financial education spending is 324,582.4 million yuan among the seven independent variables, and the smallest increase is in the total number of books printed at 3,558 million copies.

3.3 Multiple Linear Regression Method

The data collected this time is the size of the online education market in China from 2008-2021 and the related factors influencing it, and its data is cross-sectional, so the author chose multiple linear regression to establish a parametric model, and the model is as follows.

$$Z = C + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + \varepsilon$$

Z is the dependent variable, i.e., the education size of the online market; C is a constant term, which has no practical significance in general; a_i is the extent to which specific factors affect the size of the online education market, and X_i is the quantitative value of the influencing factors; X_1 is the average number of higher education schools per 100,000 population, X_2 is the gross national income, X_3 is the financial education expenditure, X_4 is the market size of China's IDC industry, X_5 is the Internet penetration rate, X_6 is the expenditure on research and experimental development, X_7 is the total number of books printed, and ε is the error term.

The main idea of multiple linear regression analysis is: for a given practical problem, find a certain factor and several other factors that have a significant effect on it, and establish a mathematical model to express the relationship by starting from a set of known observations and using relevant theories and statistical software to analyze the variance, and then conduct statistical tests on the significance, credibility and goodness of fit and standard error of the model. If the model passes the test, the model is considered significant. If the test is passed, it means that the regression model established is reasonable and reliable, the regression equation is significant and the fit is good, and finally, the regression model is used to predict and control the given problem, so as to provide reference and reference for making certain decisions.

3.4 Evaluation

This paper mainly selects the statistical data from the official website of the National Bureau of Statistics, which can ensure the authority of the data sources in the process of empirical evidence. However, in the selection of factors affecting the development of the online education market, due to the limitation of the scale of the study, the author has only selected seven factors of relative importance, and there may still be incompleteness in the selection of factors.

This paper finally chose to establish a multiple linear regression model, and because this paper involves socio-economic research, there may be a certain amount of multicollinearity in the variable selection for certain independent variables, which the author believes can be ignored when the corresponding values are not large. The multiple linear regression model can explore the relationship between the size of the online education market and its influencing factors as well as the degree of influence, and the author can propose corresponding measures for different influencing factors in order to achieve quality in the online education market.

4. Finding & Analysis

In order to determine whether there is a correlation between online education market size and its influencing factors before a linear regression can be conducted, it is necessary to observe whether there is a correlation between the seven factors and online education market size using spss before the regression model is built.

4.1 Correlation Analysis

Based on the values of market size in the above table, it can be observed that the two-tailed significance p-value of online education market size and its seven influencing factors are all 0.000, indicating that there is a very significant correlation between the independent and dependent variables, so we chose to perform a linear regression analysis on them.

Table 3. Correlations

		y	x1	x2	x3	x4	x5	x6	x7
y	Pearson Correlation	1	.629**	.950**	.937**	.502	.935**	.960**	.939**
	Sig. (2-tailed)		.006	.000	.000	.068	.000	.000	.000
	N	14	14	14	14	14	14	14	14
x1	Pearson Correlation	.629**	1	.547*	.455	.696**	.483	.595*	.474
	Sig. (2-tailed)	.006		.043	.102	.006	.080	.025	.087
	N	14	14	14	14	14	14	14	14
x2	Pearson Correlation	.950**	.547*	1	.990**	.571*	.988**	.996**	.970**
	Sig. (2-tailed)	.000	.043		.000	.033	.000	.000	.000
	N	14	14	14	14	14	14	14	14
x3	Pearson Correlation	.937**	.455	.990**	1	.476	.992**	.981**	.975**
	Sig. (2-tailed)	.000	.102	.000		.086	.000	.000	.000
	N	14	14	14	14	14	14	14	14
x4	Pearson Correlation	.502	.696**	.571*	.476	1	.534*	.616*	.399
	Sig. (2-tailed)	.068	.006	.033	.086		.049	.019	.157
	N	14	14	14	14	14	14	14	14
x5	Pearson Correlation	.935**	.483	.988**	.992**	.534*	1	.987**	.954**
	Sig. (2-tailed)	.000	.080	.000	.000	.049		.000	.000
	N	14	14	14	14	14	14	14	14
x6	Pearson Correlation	.960**	.595*	.996**	.981**	.616*	.987**	1	.953**
	Sig. (2-tailed)	.000	.025	.000	.000	.019	.000		.000
	N	14	14	14	14	14	14	14	14
x7	Pearson Correlation	.939**	.474	.970**	.975**	.399	.954**	.953**	1
	Sig. (2-tailed)	.000	.087	.000	.000	.157	.000	.000	
	N	14	14	14	14	14	14	14	14
**.Correlation is significant at the 0.01 level(2-tailed). *.Correlation is significant at the 0.05 level(2-tailed).									

Source: SPSS

4.2 First Regressing

Table 4. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	1.000 ^a	.999	.999	39.89068

a. Predictors: (Constant), x7, x4, x1, x5, x3, x2, x6

b. Dependent Variable: y

Source: SPSS

From the above graph, the goodness of fit is 0.990 and the modified goodness of fit is 0.999, which indicates that the model fits the sample well. Usually, a Durbin-Watson value close to 2 indicates that the independent variables are relatively independent from the dependent variable. And the Durbin-

Watson value in this paper is 3.215, which indicates that the independent and dependent variables are relatively independent for each year, and can be well fit for regression analysis.

Table 5. Coefficients^a

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	sig.	Collinearity Tolerance	Statistics VIF
1	(Constant)	-4971.537	902.379		-5.509	.002		
	x1	2.479	.348	.223	7.119	.000	.092	10.811
	x2	-.005	.001	-1.095	-5.048	.002	.002	519.143
	x3	-.029	.021	-.275	-1.404	.210	.002	423.037
	x4	-.071	.006	-.411	-12.066	.000	.078	12.819
	x5	-24.006	9.310	-.311	-2.579	.042	.006	160.29
	x6	.436	.045	2.687	9.609	.000	.001	862.415
	x7	6.151	7.228	.064	.851	.427	.016	62.694

a. Dependent Variable: y

Source: SPSS

The author chose a 95% confidence level, so when the p-value is less than 0.05, it means that the independent variable has a significant effect on the dependent variable. From the significance of the above figure, it can be obtained that the p-value is 0.210 and 0.427, respectively, except for the two least significant influences of Financial education funding (X_3) and Total number of books printed (X_7); since the Internet penetration rate (X_5) has a p-value of 0.042, which is relatively close to 0.05, the author chooses to discard this parameter for the sake of the accuracy of the model, and the linear regression of all other factors on market size is significant.

Also in the above figure, the analysis value of multiple covariance can be observed, in general, the VIF value needs to be less than 10 to indicate that there is no significant covariance between the independent variables, however, the VIF values of the above seven dependent variables are all greater than 10, except for number of students in school per 100,000 population (X_1) and China IDC industry market size (X_4), the VIF values of all other dependent variables are much larger than 10, which indicates that there is a serious multicollinearity among the independent variables.

4.3 Correction of Multicollinearity and Statistical Tests of the Model

Based on the above analysis, the author eliminated the three independent variables that were not significant, financial education expenditure, Internet penetration rate, and total number of books printed, and conducted further regressions on number of students in school per 100,000 population, Gross National Income, the independent variables China IDC industry market size, and research and Experimental development expenditure for four parameters were further regressed.

Table 6. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.999 ^a	.998	.997	58.21232	1.778
a. Predictors: (Constant), x6, x1, x4, x2					
b. Dependent Variable: y					

Source: SPSS

From the above graph, the goodness of fit is 0.998 and the modified goodness of fit is 0.997, indicating that the model fits the sample well. the Durbin-Watson value is 1.778, indicating that the independent and dependent variables are relatively independent for each year, which allows for good regression analysis.

Table 7. Coefficients^a

Model		Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	sig.	Collinearity Tolerance	Statistics VIF
1	(Constant)	-7336.182	596.381		-12.301	.000		
	x1	3.493	.255	.314	13.717	.000	.368	2.715
	x2	-.004	.001	-.860	-4.067	.003	.004	231.742
	x4	-.064	.004	-.369	-16.485	.000	.385	2.598
	x6	.302	.036	1.857	8.325	.000	.004	257.785

a. Dependent Variable: y

Source: SPSS

From the significance of the above figure, it can be obtained that the p-value of all the three parameters is 0.000 except for Gross National Income which has a p-value of 0.003, indicating that these four self-factors have a significant effect on the market size.

Also, in the above figure the analysed values of multicollinearity can be observed, number of students in school per 100,000 population and market size of China IDC industry (X_4) have VIF values of 2.715 and 2.598 respectively, which indicates that there is no multicollinearity between these two independent variables and other independent variables. However, the VIF values of Gross National Income and Research and Experimental Development Expenditure (X_6) are 231.742 and 257.785 respectively, which are much larger than 10 according to the above graph, but we can make it clear that the relationship between income and expenditure originally has a direct effect, so the author thinks we can ignore this covariance. Briefly, in this model the author solves the problem of severe covariance of multivariate parameters.

$$z = -7336.182 + 3.493X_1 - 0.004X_2 - 0.064X_4 + 0.302X_6$$

The specific meanings of the above vectors are analysed as follows.

(1) From the above equation Number of students in school per 100,000 population is positively proportional to the size of the online education market, the more students in school, the greater the possibility of using online learning, the larger the size of the online education market.

(2) From the above formula, Gross National Income (GNI) is inversely proportional to the size of online education market, the larger the GNI, the smaller the market size. However, in reality, the more the Gross National Income (GNI), the more the state invests in education. This contrast is attributed by the author to the fact that the more the income, the less the relative investment, so there is a slight negative correlation.

(3) From the above formula China's IDC industry market size and online education market size is inversely proportional, the larger the market size of China's IDC industry, the smaller the online education market size. Similarly, with the further development of information technology, the development of online education should be more mature, that is, under normal social environment, there should be a positive correlation between the two, but due to the emergence of the "double reduction" policy, in 2021, there is an abnormal situation that the development of information technology and the size of the online education market are inversely proportional.

(4) From the above formula, it is clear that research and experimental development expenditure is positively related to the size of the online education market, and the more research and experimental development expenditure, the larger the size of the online education market.

4.4 Testing

The above model was further tested, and the estimated size of the online education market calculated using this regression model was compared with the actual to make a line graph.

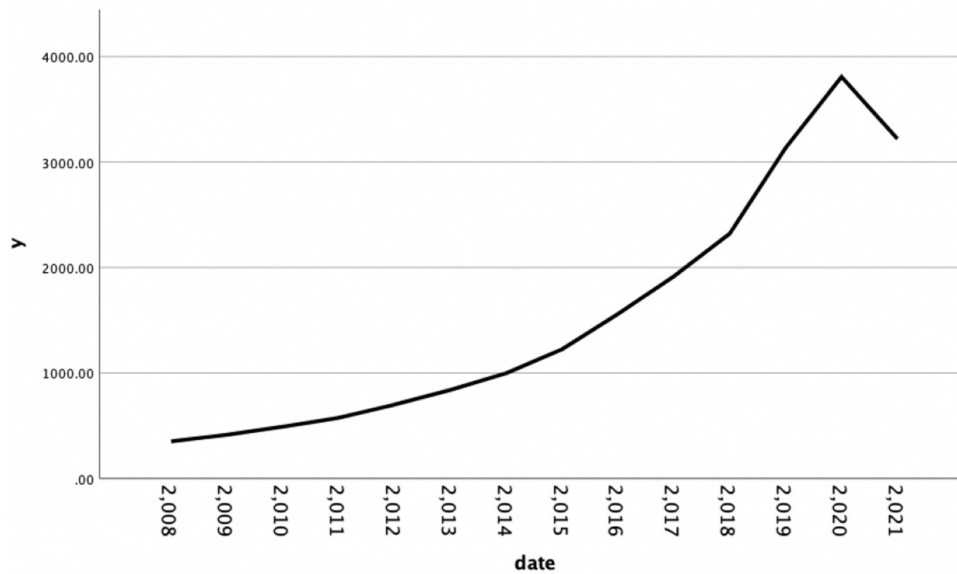


Figure 1. Actual size of the online education market

Source: SPSS

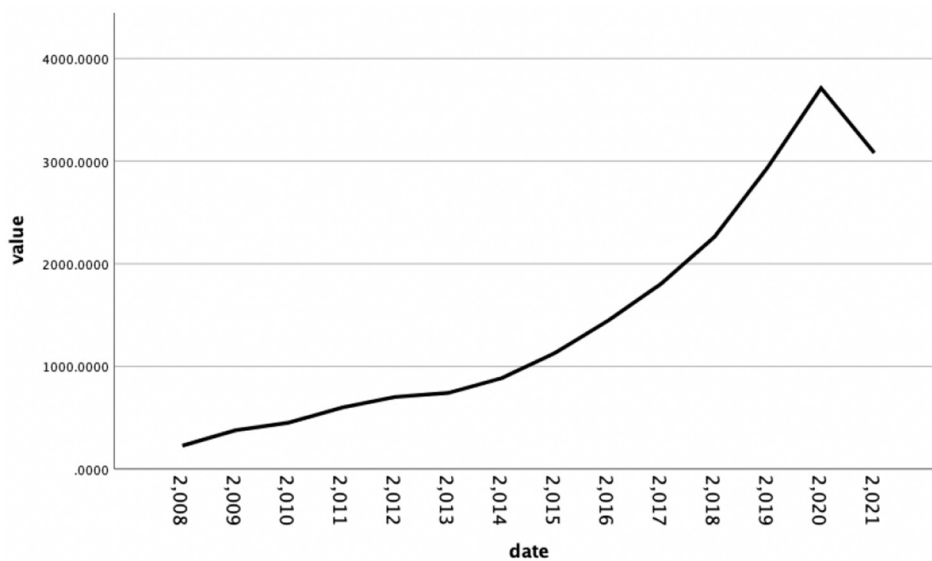


Figure 2. Estimating size of the online education market

Source: SPSS

According to the above figure, it can be seen that the estimated value data derived using the established model has a good fit with the actual historical data, and the two lines can almost overlap together.

5. Conclusion

According to the corrected regression model, the development of online education market is positively related to Number of students in school per 100,000 population and research and experimental development expenditure and online education market size, but the development of online education market is negatively related to Gross National Income (GNI) and the market size of China's IDC industry are negatively correlated, with Number of students in school per 100,000 population having the greatest impact on its development, with the market size increasing by \$349.3 million for every 100,000 students in school in China. However, the most noteworthy is that the

development of the online education market is negatively correlated with Gross National Income (GNI) and the market size of China's IDC industry is relatively unrealistic conditions of development. In real life, the more Gross National Income (GNI), the more the state will invest in education, and this contrast is attributed by the author to the more income, but the relative comparison of the input is decreasing, so there is a small negative correlation. Similarly, with the further development of information technology, the development of online education should be more mature, that is, in a normal social environment, there should be a positive relationship between the two, but due to the "double reduction" policy, in 2021 there is an anomaly that the development of information technology and the size of the online education market is inversely proportional.

This paper mainly involves the analysis of 7 parameters, in fact there are many factors affecting the development of online education, the author did not choose a large number of parameters for analysis due to limited ability, so there may be missing deficiencies in the selection of parameters, but the author selected the most closely linked 7 factors through literature analysis, to a certain extent, also maintain the quality of the analysis of factors affecting the development of online education.

Based on the results of the above empirical analysis, the main influencing factors are universally applicable. Accelerating the development of these factors will not only promote the development of online education in China, but also the improvement of the quality of online education globally, and the following recommendations are made in this paper.

1. from a global perspective, IDC is a fast-growing industry. The global IDC line market has grown from \$28.44 billion in 2013 to \$66.09 billion in 2018, with a compound annual growth rate of about 18%. China's IDC market grew from \$3.998 billion to \$18.702 billion during the same period, with a compound annual growth rate of 31%, which is at the top of the world. Moreover, China's research and experimental development funding is also increasing year by year, which is most intuitively reflected in the large number of new patents and inventions filed every year. As the "hardware" and "software" of online education development, their importance is self-evident. Nonetheless, the epidemic has brought to light many problems in both areas. For example, Lembani, Gunter, Breines, and Dalu (2020) observed that there is a digital divide between urban and rural areas, with students in rural areas often not having adequate access to information and communication technologies. Even if they can participate in online courses, many students or teachers report problems such as network lag, poor screen clarity, and poor audio and video quality. All these problems affect the user experience of online education and cause user churn. China started late in these two areas, but the growth rate is fast. If the attention to IDC industry and hardware equipment research and development is increased appropriately, the shortcomings in these two areas will be made up, which will provide a better environment for the development of the online education market.

2. Online education is not only promoted by the state, but also has a huge potential user base, but how to attract and manage these users and improve the completion of all aspects of the course is also a very important issue. This type of online learning lacks the classroom learning environment that traditional offline courses have. When teaching online for long periods of time, it is easy for students to get bored and become bored, and these emotions (Essadek & Rabeyron, 2020) are the direct cause of their low motivation to learn. At the same time, it requires students to have some self-control because their attention is easily drawn to situations outside the teaching process, which may cause them to lose focus, such as automatic pop-ups on the computer. And it is not easy for students to get timely answers to their doubts after class. So, in addition to technology, how to let students build their independent learning ability, keep their attention on online courses and improve learning efficiency is also one of the directions to focus on.

The rapid development of online education has attracted much attention and capital has been competing for entry. However, the fierce market competition has also greatly increased the cost of operation, maintenance and customer acquisition. The uneven qualifications of platforms also have a great impact on the reputation of online education. How to improve hardware and software services while ensuring students' learning efficiency and quality of courses will be a big test for online education in the post-epidemic era.

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