УДК 330.47

Zatonatska T.
Doctor of Sc., Associate Professor,
Professor of Economic Cybernetics Department,
Taras Shevchenko National University of Kyiv
Ukraine;e–mail: tzatonat@ukr.net
Novosolova V.
Master student of Economic Cybernetics,
Taras Shevchenko National University of Kyiv,
Ukraine; e–mail: valeria_novos@ukr.net

MODELING OF IMPACT OF E–COMMERCE ON ECONOMIC DEVELOPMENT

Abstract. Introduction. The emergence and spread of e–commerce greatly influenced the development of both national and global economies. The e–commerce has affected the global economy in many different ways. First of all, it has affected the information technology, and all the economic sectors, all and above e–commerce has enhanced the productivity growth worldwide. Fundamentally new information technologies in the sphere of IT business appeared under the e–commerce influence (cloud services, electronic payment systems, handling of large unstructured data, etc.). In the article the role of e–commerce as a promising sector in the economy of Ukraine, the peculiarities of electronic commerce in the country. A model based on the Cobb–Douglas function, which allowed to conduct research performance impact of electronic commerce on economic development and economic growth.

Aims. The aim of the article is to construct economic and mathematical models that will allow studying the influence of the indicators of e–commerce on economic growth and economic development of the country.

Methods. The methods of statistical analysis and economic and mathematical were used.

Results. The study revealed the following features of the e–commerce market in Ukraine: e–business in the country is at the start stage of development and has broad prospects for further growth; we can observe rapid development and growth of e–commerce compared with Europe; there is increasing of influence of electronic commerce on the economy of Ukraine. The construction of econometric models demonstrated the presence of the impact of electronic commerce on economic development of Ukraine. It was also proved the dependence between e–commerce and economic development of Poland by modeling. Comparing the models confirmed the fact that e–commerce in Poland reached the highest level of development. However, the pace of development of e–business in Ukraine is much higher than in Poland.

Conclusion. It was determined the dependence between e–commerce tools and the economic development of Ukraine by constructing of econometric models Analysis of the models proved the possibility of using them to study the impact of e–business on the economy of Ukraine.

Keywords: e–commerce, model Cobb–Douglas, economic development.

JEL classification: C50, P52

Formulas: 5; fig.: 3; tabl.: 3; bibl.: 20.

Затонацька Т. Г.
д.е.н., професор, кафедра економічної кібернетики,
Київський національний університет
імені Тараса Шевченка
Україна; e–mail: tzatonat@ukr.net
Новосьолова В. О.
магістр, кафедра економічної кібернетики,
Київський національний університет
імені Тараса Шевченка,
Україна; e–mail: valeria_novos@ukr.net

МОДЕЛЮВАННЯ ВПЛИВУ ЕЛЕКТРОННОЇ КОМЕРЦІЇ НА ЕКОНОМІЧНИЙ РОЗВИТОК КРАЇНИ

Анотація. В статті розкрито роль електронної комерції як перспективної галузі в економіці України, розглянуто особливості розвитку електронної комерції в країні. Побудовано моделі на основі функції Коба–Дугласа, які дозволили провести дослідження впливу показників електронної комерції на економічний розвиток та економічне зростання країни.

Ключові слова: електронна комерція, модель Коба–Дугласа, економічний розвиток.

Формул: 5; рис.: 3; табл.: 3; бібл.: 20.

Затонацкая Т. Г.
д.э.н., профессор кафедры экономической кибернетики,
Киевский национальный университет
имени Тараса Шевченко
Украина; e–mail: tzatonat@ukr.net
Новосёлова В. А.
магістр кафедры экономической кибернетики,
Киевский национальный университет
имени Тараса Шевченко,
Украина; e–mail: valeria_novos@ukr.net

МОДЕЛИРОВАНИЕ ВЛИЯНИЯ ЭЛЕКТРОННОЙ КОММЕРЦИИ НА ЭКОНОМИЧЕСКОЕ РАЗВИТИЕ СТРАНЫ

Аннотация. В статье раскрыта роль электронной коммерции как перспективной отрасли в экономике Украины, рассмотрены особенности развития электронной коммерции в стране. Построены модели на основе функции Кобба–Дугласа, которые позволили провести исследование влияния показателей электронной коммерции на экономическое развитие и экономический рост страны.

Ключевые слова: электронная коммерция, модель Кобба–Дугласа, экономическое развитие.

Формул: 5; рис.: 3; табл.: 3; библ.: 20.

Introduction. The emergence and spread of e–commerce greatly influenced the development of both national and global economies. The e–commerce has affected the global economy in many different ways. First of all, it has affected the information technology, and all the economic sectors, all and above e–commerce has enhanced the productivity growth worldwide [14]. Fundamentally new information technologies in the sphere of IT business appeared under the e–commerce influence (cloud services, electronic payment systems, handling of large unstructured data, etc.). The emergence of new technologies and their dissemination through the growing number of consumers engaged in buying online had quite strong influence on the development of national sectors and rules of e–commerce. It is also necessary to note the fact of appearance of a large number of jobs created in the sector of e–commerce. We can say that the development of e–commerce and its neighboring areas has a dynamic effect on the parameters of economic development. E–commerce has a tremendous growth potential and also generates economic growth in the country. In order to realize its full potential to bring about the structural changes needed for economic development, it is important to recognize that e–commerce provides an environment in which new activities can fruitfully be developed. Its interaction with various aspects of growth has to be self–reinforcing to yield the required rate of growth. [1]

According to Eurostat, the share of e–commerce in 2016 accounted for 2.9% of China's GDP, 4% of GDP in Germany, 3.4% in France, 5.6% of Japan's GDP and more.

E–commerce is not only one of the fastest growing industry, it acts as a customer of innovative technologies and plays an important role in development. The spread of electronic

commerce contributes to job creation, the emergence of new services and industries, workforce transformation and so on. In addition, results from different countries confirm the positive impact of e–commerce on economic growth. For example, increasing penetration of broadband (which is an important factor for the business) by 10% contributed to 1.4% GDP growth in emerging markets. In China, this figure could reach 2.5%. [3–5]

Research. The study on the prospects for the development of e–commerce and its impact on economic development was engaged by foreign and domestic scholars like Kenneth A., R. Solow, A. Tofler, O.Sobenko, V. Pleskach, A. Chubukov, Y. Lysenko, L . Ponomarenko end others.

Research results. Nowadays, almost half of humanity uses the Internet and more than every fourth inhabitant of the planet is online – buyer. A global leader in e–commerce in 2016 were China – 33.7%; US – 26.2%; England – 7.7%; Japan – 5.0% and France – 3.2%.

Ukrainian online – trade is one of the most dynamic markets, it enters the small number of segments of the economy that continues to grow and develop, despite the crisis, jumps in exchange rates and other challenges facing the country in recent years. According to the information portal Web Expert 67% of Ukrainian Internet – users visit sites that work in the field of e–commerce [2].

Since 2007 e–commerce is growing in Ukraine. In addition, the spread of the industry increases every year. The volume of Internet – trade in Ukraine amounted to more than $5 billion in 2016. According to analytical companies' forecasts this indicator can be reached to $14 billion in 2020 (figure 1).

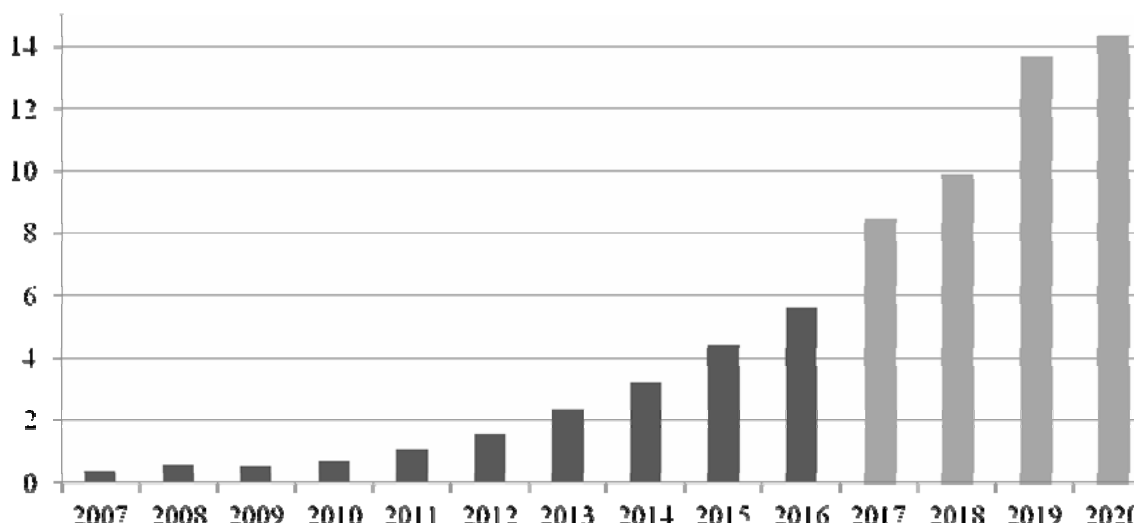## The volume of Internet trade in Ukraine, S bln.

Figure 1. Dynamic of volumes of Internet – trade in Ukraine in 2007–2016 years, the forecasts of Internet – trade in 2017–2020.
Source: https://www.web–mashina.com/web–blog/ecommerce–prognoz–elektronnoi–kommercii–ukrainy–2017–
2018?gclid=CjwKEAjwqZ7GBRC1srKSv9TV_iwSJADKTjaD CnHXkXE3iXq2p3r4r
Liuq6gUoq3ko06TZMnk8Wr16xoCHgLw_wcB

Increasing of Internet penetration rate – the number of people using the Internet in the total population of Ukraine – contributed to the rapid growth in popularity of e–commerce. This indicator was 3% 2000, 30% in 2010, and the Rate of Internet penetration was 62% in 2016.

Figure 2 shows the comparison of the volume of Internet – trade in Poland and Ukraine in 2008 – 2016. We can see that the volume of e–commerce in Poland significantly higher than in Ukraine.
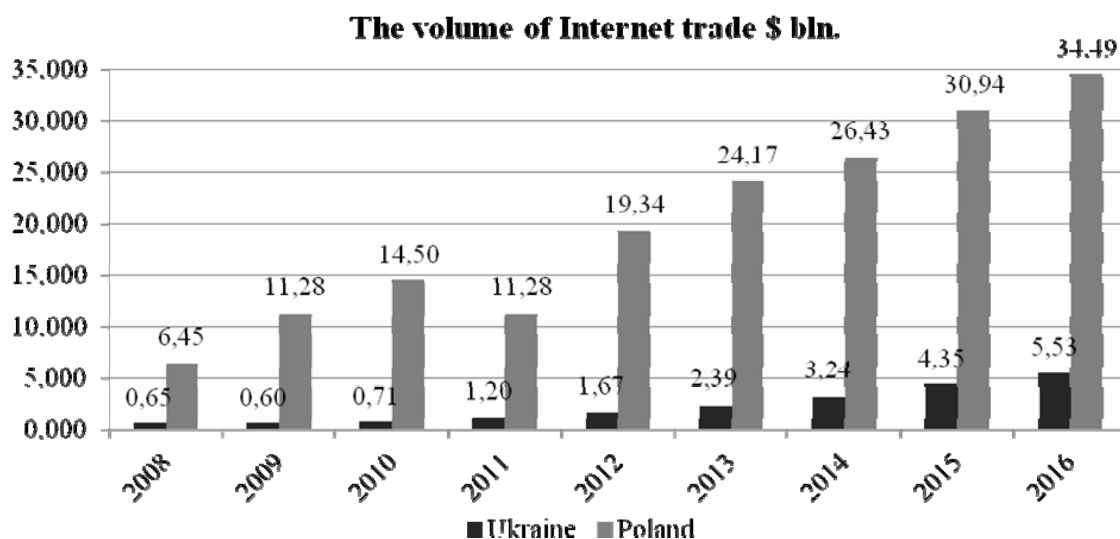
267

The volume of Internet trade $ bln.

Figure 2. The comparison of the volume of Internet – trade in Poland and Ukraine in 2008 – 2016.
Source: Eurostat, UNCTAD

Between 2001 and 2016 the number of Internet shops in Poland increased almost in 50 times (there were about 560 online stores on the territory of the country in 2001, and more than 16,000 online stores in the end of 2015). The growth rate of e–commerce in Ukraine has the leading position last years despite the fact that Poland is ahead of our country in terms of Internet – trade and number of e–stores.

We can confirm the importance of e–business for the economy by comparing it with one of the leading industries in Ukraine – agriculture, because agriculture's share in GDP is over 10%. Figure 3 shows the trend of Internet – trade shares in GDP and the trend of volumes of agricultural products in GDP in 2001 – 2016. Despite the fact that the rate of e–commerce slowed in recent years, it must be said that the share of e–commerce in GDP of Ukraine is constantly growing, while the growth rate of the share of agribusiness in Ukrainian GDP has negative values.

The trend of Internet - trade shares in GDP and the trend of volumes of agricultural products in GDP in Ukraine, 2001 - 2016
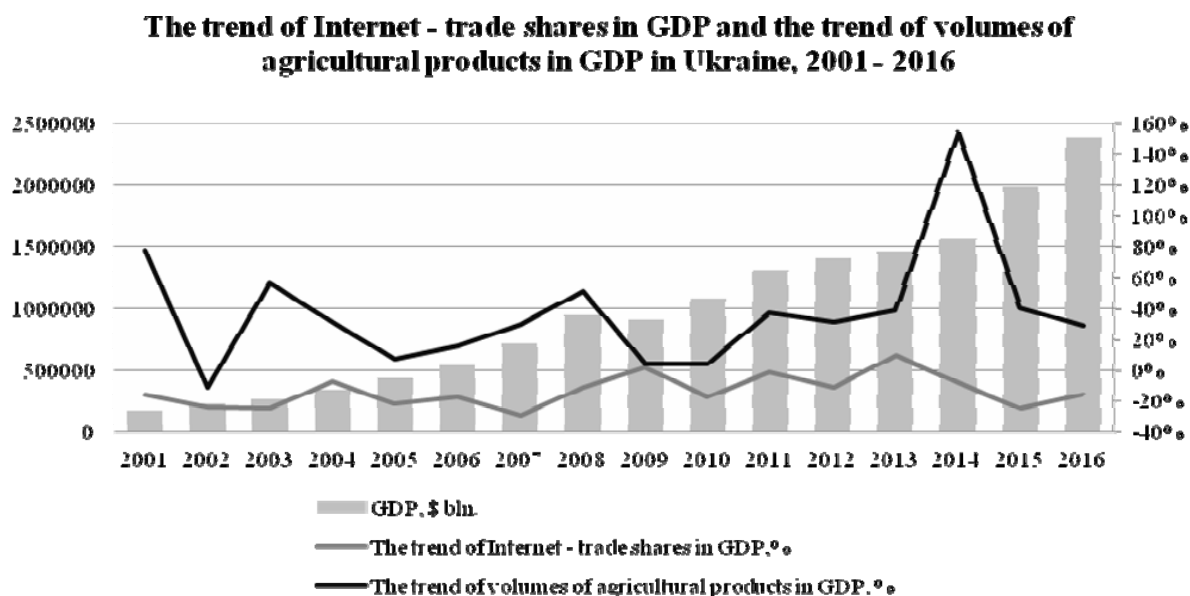
Figure. 3. Comparison of the trend of Internet – trade shares in GDP and the trend of volumes of agricultural products in GDP in Ukraine, 2001 – 2016.
Source: Eurostat, Forbes Ukraine

268

Next we will try to make simulation of e–commerce influence on the economic indicators of the country. We propose to build economic – mathematical models based on the Cobb–Douglas function framework (example of dependence) to determine the relationships between e–commerce and development of the country. [12, 20]

Production function Cobb–Douglas is a handy tool in the economy, which reflects the relationship between the production and production factors such as labor and capital. The framework of this model will be used to study the relationships between the parameters characterizing e–commerce and variable reflecting economic development. Two models were built to study the impact of electronic commerce on the development and growth of Ukraine. The dataset was constructed on the basis of statistical data for the period from 2000 to 2016, annual data was taken. [9, 11, 16]

Let's analyze the first model. We took next two independent parameters that represent the level of development of e–commerce in Ukraine for model`s construction: the share of Internet retail trade in Ukraine in percentage and the volume of Internet – trade in Ukraine in $ bln. The dependent parameter in the model is unemployment rate in percentage.

The model in mathematical form will be as follows:

$$\ln Upl = \ln A + \alpha \ln PIT + \beta \ln IT \qquad (1)$$

where Upl – an unemployment rate; A – a sustainable rate that reflects the level of unemployment that prevails in the country without the influence of factors of electronic commerce and the Internet; PIT – the share of Internet retail trade; IT – the volume of Internet – trade; α , β – elasticity of independent variables.

It should be noted that using of this model gives the ability to scale expression and growth rate of dependent variable by interpretation of elasticity coefficients.

All calculations and mathematical operations were conducted in Excel and R Studio. The results can be displayed by using the equation:

$$\ln Upl = 2{,}675\text{-}0{,}343 \ln PIT + 0{,}206 \ln IT \qquad (2)$$

We can see that elasticity of unemployment to share of Internet retail trade is –0.343%. So unemployment rate drops in 0.343% with increase in share of Internet retail trade per unit (inverse relationship). The elasticity of unemployment to the volume of Internet – trade in Ukraine is 0.206%, so unemployment will increase in 0.206% with the growth of online commerce per unit (direct relationship). Sustainable 2,68% ratio indicates the level of unemployment in Ukraine, which is installed without the impact of all factors, or in situation of their absence.

If we analyze the amount of elasticity coefficients $\alpha + \beta = \text{-}0{,}343 + 0{,}206 = \text{-}0{,}137$, we can see that cumulative effect of factors contributed to the decrease of the dependent variable (reduction of unemployment in Ukraine).

We can summarize the simulation results in the following table:

Table 1.

Simulation results

Variables	Coefficients value	p–value	Residual error
$Ln\ A$	2,6747	7,536E–13	0,1100
$Ln\ PIT$	–0,3430	0,00026	0,0709
$Ln\ IT$	0,2065	0,00149	0,0525
F–test value	15,3036		
R^2 value	0,6861		

In the analysis of the model we should pay attention to the coefficient of determination $R^2 = 0{,}686$, which indicates weak relationships between variables. All the coefficients near the variables are significant (at a significance level $\alpha = 0{,}95$). The correlation coefficient between

variables $r = \sqrt{R^2} = \sqrt{0,6861} = 0,838 < 0,9$ is rather high, but doesn`t reach the desired level. So it is possible to confirm the finding of dependence between variables.

It was logical to ask if there is multicollinearity between parameters in the model. The assumption of the presence of multicollinearity was rejected by using VIF–test.

The stability also was tested by advanced Dicke Fuller test (ADF – test). Low p–value indicates a stationary time series. The absence of autocorrelation was confirmed by using Broysh – Godfrey test. However, there is heteroskedasticity in our model, which we confirmed by using White test.

The present results give us possibility to affirm that constructed model can be used in researches. We can investigate relationship between the spread of e–commerce and indicator of country development by using this model.

The next model was built to reflect the relationship between e–commerce and economic growth in Ukraine. As independent variables were taken volume of Internet – trade in Ukraine \$ bln. and Internet penetration rate in the country in percentage (as the number of people using the Internet in the total population). As dependent parameter and indicator reflecting the economic growth was elected GDP per capita in USD. . The dataset was constructed on the basis of statistical data for the period from 2000 to 2016, annual data was taken. [9, 16]

This model also bases on the Cobb–Douglas function. And in general represented by the equation:

$$\ln GDP = \ln S + \gamma \ln IT + \lambda \ln IP \tag{3}$$

where GDP – GDP; S – a steady rate reflecting the level of GDP without the e–commerce influence; IP – Internet penetration; IT – the volume of Internet – trade; γ, λ – elasticity of independent variables.

We can summarize the simulation results in the following table:

Table 2.

Simulation results

Variables	Coefficients value	p–value	Residual error
Ln S	3,5084	0,0011	2,0556
Ln IT	0,3478	0,0026	0,2960
Ln IP	1,2527	0,0049	0,5924
F–test value	19,525		
R^2 value	0,7360		

The model equation is:

$$\ln GDP = 3,508 + 0,348 \ln IT + 1,253 \ln IP \tag{4}$$

We can see that the elasticity of GDP per capita to volume of Internet – trade is 0.348% (direct relationship), the GDP per capita in Ukraine will increase in 0.348%. with the growth rate of Internet – trade per unit. The elasticity of GDP to Internet penetration is 1.253% – a high value indicates that the increase in the percentage of Internet users will effect on increase of GDP per capita by 1.25%. If we analyze the amount of elasticity coefficients we can see that $\alpha + \beta = 0,348 + 1,253 = 1,601$, so the cumulative effect of factors contribute to the significant increase of the dependent variable during the period.

In the analysis of the model we should pay attention to the coefficient of determination $R^2 = 0,736$, which indicates a weak relationship between variables. All the coefficients near the variables are significant (at a significance level $\alpha = 0,95$). The correlation coefficient between the variables are high $r = \sqrt{R^2} = \sqrt{0,736} = 0,858 < 0,9$ so we can be say about dependence between selections.

270

Using of VIF criteria to the model gave grounds for rejecting the assumption of the existence of multicollinearity between variables. The absence of autocorrelation was confirmed using a Breush – Godfrey test. However, heteroskedasticity was presented in our model, as in the previous, that was tested using White test.

The second model is also important for tracking usage and connection options between e–commerce and economic growth.

Let`s conduct a comparison with Poland to assess the impact of e–commerce development in Ukraine. We built the similar to the second model that shows the relationship between the volume of Internet – trade in Poland $ bln. and Internet penetration rate and GDP per capita in USD during the same period; annual data was taken from 2000 to 2016. [9, 16]

The equation is:

$$\ln GDP_{Poland} = 11{,}437 + 0{,}344 \ln IT_{Poland} + 0{,}610 \ln IP_{Poland} \qquad (5)$$

As we can see, the elasticity of GDP per capita in Poland to the volume of Internet – trade is 0.344% (direct correlation), which is at 0,004% less than in Ukraine. This means that the impact of Internet – trade on GDP in our country is more important. The elasticity of GDP to Internet penetration is 0.610%, this means that the increase in the percentage of Internet users will increase the level of GDP per capita at 0.610%.

Table 3.

Simulation results

Variables	Coefficents value	p–value	Residual error
$Ln\ S_{Poland}$	11,4372	5,57E–12	0,5448
$Ln\ IT_{Poland}$	0,3442	5,52E–05	0,0604
$Ln\ IP_{Poland}$	0,6098	0,004	0,1768
F–test value	99,366		
R^2 value	0,9341		

The high value of the coefficient of determination $R^2 = 0{,}934$ means that the Poland model which reflects the influence of e–commerce factors on GDP per capita is characterized by a close relationship between variables. All the coefficients near the variables are significant (at a significance level $\alpha = 0{,}95$). The correlation coefficient between the variables are high $r = \sqrt{R^2} = \sqrt{0{,}934} = 0{,}966 > 0{,}9$, so we can be say about dependence between variables.

It was rejected hypothesis of multicollinearity by using VIF–criterion, the absence of heteroscedasticity was confirmed by using White test.

So, we can say that the model of influence of e–commerce parameters on GDP per capita in Poland shows more strong dependence between variables than in Ukraine. This means that e–business in Poland is more common than in our country, and has a noticeable impact on the economy at this stage.

Conclusions. The study revealed the following features of the e–commerce market in Ukraine: e–business in the country is at the start stage of development and has broad prospects for further growth; we can observe rapid development and growth of e–commerce compared with Europe; there is increasing of influence of electronic commerce on the economy of Ukraine.

The construction of econometric models demonstrated the presence of the impact of electronic commerce on economic development of Ukraine.

Analysis of the first model shows the relationship between such indicators as the share of Internet – retail trade in the country, the volume of Internet – trade (parameters representing e–commerce) and the unemployment rate in Ukraine (the figure that represents the level of development). The model is adequate and reflects the fact that the spread of e–commerce reduces the unemployment rate in Ukraine.

Research of the second model has proven the presence relationship between such e–commerce indicators: the volume of Internet – trade and Internet penetration, and an indicator of

economic growth – GDP per capita. Analysis of the model confirmed a positive dependence between variables and proved that the spread of e–commerce in Ukraine contributes to GDP per capita.

It was also proved the dependence between e–commerce and economic development of Poland by modeling. Analysis of the model made it possible to assess the degree of influence of the volume of Internet – trade, Internet penetration and GDP per capita in Poland. It was proved that the parameters representing e–commerce in Poland have a greater impact on the economy of studied European country compared with those in Ukraine. Comparing the models confirmed the fact that e–commerce in Poland reached the highest level of development. However, the pace of development of e–business in Ukraine is much higher than in Poland.

It was determined the dependence between e–commerce tools and the economic development of Ukraine by constructing of econometric models Analysis of the models proved the possibility of using them to study the impact of e–business on the economy of Ukraine.

Література
1. Albastroiu, I. Contribution of the e–commerce to the economic development [Text] / I. Albastroiu // International Conference on Business Excellence. – 2007. – Vol. 6, № 5. – P. 3–8.
2. Web Expert [Electronic resource]. – Available at: https://webexpert.com.ua/ua/elektronna–komertsiya–v–ukrayini–2016.
3. Валькова, Н. В. Розвиток Інтернет – торгівлі в Україні: динаміка та вплив факторів [Текст] / Н. В. Валькова // Економіка. – 2014. – № 2 (43). – С. 39–42.
4. Динамика пользования Интернет в Украине: февраль – март 2016 [Электронный ресурс] // Киевский международный институт социологии. – Режим доступа: http://kiis.com.ua/?lang=rus&cat=reports&id=621&page=2.
5. Дубовик, Т. Інтернет – торгівля в Україні [Текст] / Т. Дубовик // Вісник КНТЕУ. – 2013. – № 1. – С. 20–28.
6. Зелінська, Ю. С. Вплив інформаційних технологій на економіку [Електронний ресурс] / Ю. С. Зелінська // Моделювання економіки: проблеми, тенденції, досвід : VII Міжнародна науково–методична конференція Форум молодих економістів–кібернетиків (21–22 жовтня 2016 р., м. Тернопіль). – Режим доступу: http://elartu.tntu.edu.ua/bitstream/123456789/18405/2/Conf_2016_Zelinska_Y_S–Influence_of_information_107–109.pdf.
7. Развитие рынка E–commerce в Украине [Электронный ресурс]. – Режим доступа: http://www.plan.biz.ua/files/s_bp.pdf.
8. Рынок электронной коммерции в Украине [Электронный ресурс]. – Режим доступа: http://hub.kyivstar.ua/rynok–elektronnoy–kommercii–ukrainy/
9. Минфин [Электронный ресурс]. – Режим доступа: http://index.minfin.com.ua.
10. Электронная коммерция (e–Commerce): тренды и прогноз развития в Украине на 2017–2018 гг. [Электронный ресурс]. – Режим доступа: https://www.web–mashina.com/web–blog/ecommerce–prognoz–elektronnoi–kommercii–ukrainy–2017–2018?gclid=CjwKEAjwqZ7GBRC1srKSv9TV_iwSJADKTjaDCnHXkXE3iXq2p3r4rLiuq6gUoq3ko06TZMnk8Wr16xoCHgLw_wcB.
11. UNCTAD [Electronic resource]. – Available at: http://unctad.org/en/Pages/statistics.aspx.
12. Dharmasiri, L. M. Application of Cobb–Douglas Function for Analyzing the Process of Agricultural Production: A Case Study from Sri Lanka [Electronic resource] / L. M. Dharmasiri, V. S. Datye. – Available at: https://www.researchgate.net/publication/241695593_Application_of_CobbDouglas_Function_for_Analyzing_the_Process_of_Agricultural_Production_A_Case_Study_from_Sri_Lanka.
13. Forbes Ukraine [Electronic resource]. – Available at: http://forbes.net.ua/opinions/1401679–selskoe–hozyajstvo–ukrainy–nakanune–prodovolstvennogo–krizisa.
14. El Gawady, Z. M. The Impact of E–commerce on Developed and Developing Countries Case Study: Egypt and United States [Electronic resource] / Z. M. El Gawady. – Available at: http://www.must.edu.eg/Publications/Businees_Res5.pdf.
15. Epstein, M. J. Implementing e–commerce strategies [Electronic resource] / M. J. Epstein. – Available at: https://books.google.ru/books?id=Kn6MWyz5–s8C&pg=PA214&lpg=PA214&dq=ecommerce+laureate+nobel&source=bl&ots=22mHN58T_b&sig=wts7AVWOwn8eXZx4FLOmZGekJAw&hl=uk&sa=X&ved=0ahUKEwjyieGz6LXSAhWiC5oKHS2gBA8Q6AEIVTAI#v=onepage&q=ecommerce%20laureate%20nobel&f=false][http://home.uchicago.edu/~vlima/courses/econ200/spring01/stigler.pdf.
16. Eurostat [Electronic resource]. – Available at: http://ec.europa.eu/eurostat.
17. Hossain, M. Z. Use of Cobb–Douglas production model on some selected manufacturing industries in Oman [Electronic resource] / M. Z. Hossain K. Al–Amri. – Available at: https://www.researchgate.net/publication/241708167_Use_of_Cobb–Douglas_production_model_on_some_selected_manufacturing_industries_in_Oman.
18. Malkawi, B. H. E–commerce in Light of International Trade Agreements: The WTO and the United States–Jordan Free Trade Agreement [Text] / B. H. Malkawi // International Journal of Law and Information Technology. – 2007. – Vol. 15, № 2. – P. 153–169.
19. Plant, R. T. Ecommerce: Formulation of Strategy [Electronic resource] / R. T. Plant. – Available at: https://books.google.ru/books?id=3grn9fhV0oEC&pg=PA260&lpg=PA260&dq=ecommerce+laureate+nobel&source=bl&ots=fCu2cU2EV_&sig=b89HtowJGGEDpmRz_v9_IBMSROs&hl=uk&sa=X&ved=0ahUKEwjyieGz6LXSAhWiC5oKHS2gBA8Q6AEIMzAD#v=onepage&q=ecommerce%20laureate%20nobel&f=false.
20. Simut, R. M. Estimating the Cobb Douglas production function including the export and openness in the case of Romania [Electronic resource] / R. M. Simut. – Available at: http://steconomiceuoradea.ro/anale/volume/2015/n1/072.pdf.

Стаття надійшла до редакції 05.05.2017   © *Затонацька Т. Г., Новосьолова В. О.*

References

1. Albastroiu, I. (2007). Contribution of the e–commerce to the economic development. *International Conference on Business Excellence*, *6(5)*, 3-8.

2. *Web Expert*. Available at: https://webexpert.com.ua/ua/elektronna–komertsiya–v–ukrayini–2016

3. Valkova, N. V. (2014). Rozvytok internet-torhivli v Ukraini: dynamika ta vplyv faktoriv. *Ekonomika, 2(43)*, 39-42.

4. *Dinamika polzovaniia Internet v Ukraine: fevral-mart 2016*. Available at: http://kiis.com.ua/?lang=rus&cat=reports&id=621&page=2.

5. Dubovyk, T. (2013). Internet – torhivlia v Ukraini. *Visnyk KNTEU*, *1*, 20-28.

6. Zelinska, Yu. S. Vplyv informatsiinykh tekhnolohii na ekonomiku. *Modeliuvannia ekonomiky: problemy, tendentsii, dosvid*. (2016, October). Available at: http://elartu.tntu.edu.ua/bitstream/123456789/18405/2/Conf_2016_Zelinska_Y_S–Influence_of_information_107–109.pdf.

7. *Razvitie rynka E–commerce v Ukraine*. Available at: http://www.plan.biz.ua/files/s_bp.pdf.

8. *Rynok elektronnoi kommertsii v Ukraine*. Available at: http://hub.kyivstar.ua/rynok–elektronnoy–kommercii–ukrainy/

9. *Minfin*. Available at: http://index.minfin.com.ua.

10. *Elektronnaia kommertsiia. (e–Commerce): Trendy i prohnoz razvitiiia v Ukraine na 2017-2018 gg*. Available at: https://www.web–mashina.com/web–blog/ecommerce–prognoz–elektronnoi–kommercii–ukrainy–2017–2018?gclid=CjwKEAjwqZ7GBRC1srKSv9TV_iwSJADKTjaDCnHXkXE3iXq2p3r4rLiuq6gUoq3ko06TZMnk8Wr16xoCHgLw_wcB.

11. *UNCTAD*. Available at: http://unctad.org/en/Pages/statistics.aspx.

12. Dharmasiri, L. M., Datye, V. S. *Application of Cobb–Douglas Function for Analyzing the Process of Agricultural Production: A Case Study from Sri Lanka*. Available at: https://www.researchgate.net/publication/241695593_Application_of_CobbDouglas_Function_for_Analyzing_the_Process_of_Agricultural_Production_A_Case_Study_from_Sri_Lanka.

13. *Forbes Ukraine*. Available at: http://forbes.net.ua/opinions/1401679–selskoe–hozyajstvo–ukrainy–nakanune–prodovolstvennogo–krizisa.

14. El Gawady, Z.M. *The Impact of E–commerce on Developed and Developing Countries*. Available at: http://www.must.edu.eg/Publications/Businees_Res5.pdf.

15. Epstein, M. J. *Implementing e–commerce strategies*. Available at: https://books.google.ru/books?id=Kn6MWyz5–s8C&pg=PA214&lpg=PA214&dq=ecommerce+laureate+nobel&source=bl&ots=22mHN58T_b&sig=wts7AVWOwn8eXZx4FLOmZGekJAw&hl=uk&sa=X&ved=0ahUKEwjyieGz6LXSAhWiC5oKHS2gBA8Q6AEIVTAI#v=onepage&q=ecommerce%20laureate%20nobel&f=false][http://home.uchicago.edu/~vlima/courses/econ200/spring01/stigler.pdf.

16. *Eurostat*. Available at: http://ec.europa.eu/eurostat.

17. Hossain, M. Z., & Al–Amri, K. *Use of Cobb–Douglas production model on some selected manufacturing industries in Oman*. Available at: https://www.researchgate.net/publication/241708167_Use_of_Cobb–Douglas_production_model_on_some_selected_manufacturing_industries_in_Oman.

18. Malkawi, B. H. (2007). *E–commerce in Light of International Trade Agreements: The WTO and the United States–Jordan Free Trade Agreement. International Journal of Law and Information Technology*, *15(2)*, 153-169.

19. Plant, R. T. *Ecommerce: Formulation of Strategy*. Available at: https://books.google.ru/books?id=3grn9fhV0oEC&pg=PA260&lpg=PA260&dq=ecommerce+laureate+nobel&source=bl&ots=fCu2cU2EV_&sig=b89HtowJGGEDpmRz_v9_IBMSROs&hl=uk&sa=X&ved=0ahUKEwjyieGz6LXSAhWiC5oKHS2gBA8Q6AEIMzAD#v=onepage&q=ecommerce%20laureate%20nobel&f=false.

20. Simur, M. *Estimating the Cobb Douglas production function including the export and openness in the case of Romania*. Available at: http://steconomiceuoradea.ro/anale/volume/2015/n1/072.pdf.