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Macroeconomic effects of internet use: Example of developed countries

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Abstract: ICT, one of the most important developments of today, has dragged the world into a radical change process. The rapid transformations in technology and the increase in the use of information and communication technologies have led to the emergence of the concept of digital transformation. ICT is the factor that facilitates people's living standards, provides competitive advantage in global markets, and drives the macro-economy of countries to a radical transformation. For this purpose, the effects of Information Communication Technologies on macroeconomic factors have been tried to be analyzed using the data of 2002-2020 on developed economies. In the study, panel analysis was performed on employment, growth, total population, internet usage percentage, and ICT import and ICT export variables.

Key Words: ICT, Growth, Employment, Panel Data.

1. INTRODUCTION

Fundamental changes in information and communication technologies bring along social, economic and social transformations. Transformations in fields such as education, health, finance, banking, retail trade, public and transportation have led to the emergence of the concept of digital transformation today. Digital transformation refers to the transformation experienced in business processes and emerging in society by meeting the changing demands and needs more efficiently with the rapid developments in technology. Although digital transformation is a concept that first emerged with the invention of computers, it has come to the fore with the widespread use of internet, mobile devices and personal computers. Digital transformation technologies used in many fields today, artificial intelligence, AR-VR, internet of things, blockchain, cloud computing, three-dimensional printers, horizontal and vertical integration, big data, remote working and e-commerce make human life easier. In addition, digital transformation technologies provide speed and efficiency in terms of individual, social and institutional aspects.

With the widespread use of the Internet by individuals, society and sectors, the emergence of new technologies and the adoption and effective use of these technologies is called digital transformation (Armağan, 2018; 388-389). Although the concept of digital transformation is a concept that emerged with the invention of the computer in the middle of the 20th century, it is becoming more widespread with the use of the internet, personal computers and mobile phones. With the development of technology, today, cross-border individuals and organizations are communicated over the internet, online shopping can be done, and we have the opportunity to attend an important meeting online.

The fact that the usage rates of the internet and mobile smart devices have become more widespread ensure the acceleration of digital transformation. Digital transformation not only affects people's individual lives, but also causes developments in business life. With digital transformation, the application of digital technologies to the necessary areas enables the development of new business models, the provision of information more effectively, and the ability of businesses to produce products and services for their customers by using their resources more efficiently based on the experiences of the customers (Yankın, 2019; 3-4).

With the development of technology, more than one device can interact with each other. The interaction of objects with each other is called the Internet of Things (IoT). The Internet of Things (IoT) technology is the connection of objects with each other by using the internet, collecting and sharing data without the need for human beings, of all electronic devices with on-off buttons in the world (Arslan & Kırbaş, 2016; 36). IoT technology is used in many areas, making the world we live in even smarter. Another sector that changes with the development of technology is the banking sector. The first use of internet banking applications in the banking sector led to the emergence of the digital transformation process. Internet banking is a system that enables many bank transactions to be made quickly and easily with bank accounts opened over the internet. With internet banking, individuals can perform electronic funds transfer (EFT) / money transfer, card transactions, payment transactions, bank account checks, investment instruments transactions and credit transactions quickly, easily, anywhere at any time, without transaction costs. The open banking system is a reliable service model

in which financial data is shared with third parties in order to provide better banking and financial services to individuals (Yazıcı S. , 2019, p. 7). The open banking system facilitates the access of non-bank institutions to customer data and provides individuals with appropriate opportunities to provide a higher quality service.

The basis of the new economy concept is the developing technologies and the internet (Saatçioğlu, 2005, p. 151). In the new economy, an information-oriented working order is realized instead of working principles based on muscle strength. In the knowledge-based new economy system, competition is created based on the knowledge levels of individuals, and the sales of the goods and services produced over the internet are ensured. In order to maintain its existence in the new economy, a business must reduce its costs by taking initiatives to increase its efficiency. The idea that the cost per unit in the old economy will decrease the more the production increases, provides the idea that the use of technology in the new economy and the emergence of new ideas will reduce the costs and the market conditions in the market will change (Bayraç, 2003; 56).

2. MATERIAL AND METHODS

Today, Information and communication technologies take place in all areas of life. Information and communication technologies, which have an important place in the economic dimension, are also the subject of many economic researches. For this reason, in this part of the study, the effect of digital transformation on economic growth and employment, which is one of the macroeconomic variables, on the Developed Economy countries in the years 2002-2020 is examined. The sources of the variables used in the study are given in Table 1.

Table 1: Variables Used in Panel Analysis

GDP	Growth	WDI
Employment	Total Employment	WDI
ICT_IM	ICT imports	WDI
ICT_EX	ICT export	WDI
INT_KUL_YUZDELIK	Internet Users	WDI
POPULATION	Total Population	WDI

In this part of the study, how the use of the Internet affects growth and employment, which is one of the macroeconomic factors, is examined with panel data analysis. To analyze the impact on growth and employment using an unbalanced panel dataset, the following multiple random time effects model was estimated:

MODEL 1

$LOGGDP_{it}=\beta_1 + \beta_2 LOGEmployment_{it} + \beta_3 LOGICT\_IM_{it} + \beta_4 LOGICT\_EX_{it} + \beta_5 INT\_KUL\_YUZDELIK_{it} +(\tau_t + u_{it})$

MODEL 2

$LOGEmployment_{it}=\beta_1 + \beta_2 LOGGDP_{it} + \beta_3 LOGICT\_IM_{it} + \beta_4 LOGICT\_EX_{it} + \beta_5 INT\_KUL\_YUZDELIK_{it} +(\tau_t + u_{it})$

The it sub-index above is the observation value of the ith country regarding the relevant variable in year t; model constant term; the time-specific effect that affects all countries the same but varies from time to time; represents the error term of the regression model.

Tablo2 : Model 1 ve Model 2 Results

	Model 1	**Model 2**
C	**28,04893**	**3.676096**
P-value	0.0111	*0,4262*
LOGGDP		**0.446125**
P-value		*0,0010*
EMP	**0.003595**	
P-value	*0,9138*	
LOGICTIM	**-0.61192**	**4.926021**
P-value	*0,5546*	*0,0058*
LOGICTEX	**1.31220**	**-2,954126**

P-value	*0.0111*	*0,0012*
POP	**-1.06518**	**4.161689**
P-value	*0,0030*	*0,0000*
INT-KUL-Yuzdesi	**0.00601**	**0,431049**
P-value	*0,5727*	*0,0000*
Num. ofCountries	*9*	*9*
Periods	*2000-2019*	*2000-2019*
R-square	0.293510	0.816710
F stat.	13.70976	28,47863
Prob(F stat.)	*0,0000*	*0,0000*
Cross-section Chi-square	1209,2694	245,6373
Prob(Cross-section Chi-square.)	*0,0000*	*0,0000*
Selected Model	***FEM***	***FEM***

When we look at the results of Model 1, we see that the constant term value is statistically significant. When the EMP variable is examined, it is seen that it is not statistically significant for all significance levels. It is seen that the ICTIM variable has a negative value, but the probability value is not statistically significant. This result shows that imports of computers, communications and other services do not have a significant effect on economic growth. It is seen that the ICTEX variable has a positive value and the probability value is statistically significant. This result shows that exports of computers, communications and other services have a significant effect on economic growth. It is seen that the POP variable has a negative value and the probability value is statistically significant. This result shows that population has a negative effect on economic growth. It is seen that the INT_KUL_Yuzdesi variable has a positive value, but the probability value is not statistically significant. This result shows that Internet use does not have a significant effect on economic growth.

When we look at the results of Model 2, it is seen that the constant term value is not statistically significant. When the LOGGDP variable is examined, it is seen that it is positive and statistically significant. This shows the positive effect of growth on employment. It is seen that the ICTIM variable has a positive value and the probability value is statistically significant. This result shows that imports of computers, communications and other services have a significant effect on employment. It is seen that the ICTEX variable has a negative value and the probability value is statistically significant. This result shows that exports of computers, communications and other services have a negative impact on employment. It is seen that the POP variable has a positive value and the probability value is statistically significant. This result shows that population has a positive effect on employment. It is seen that the INT_KUL_Yuzdesi variable has a positive value and the probability value is statistically significant. This result shows that Internet use has a positive effect on employment.

4. RESULTS AND DISCUSSION

In this study on developed economies, economic growth and employment variables were used as macroeconomic indicators. Although very significant results were not obtained in the growth model in the analysis, significant results were obtained in the employment model. t has emerged as a result of the analysis that economic growth and employment, which are one of the important factors of developing countries' economies, are positively affected by information and communication technologies. Increasing the exports of countries by developing infrastructure activities for information and communication technologies and reducing imports for information and communication activities positively affect the country's economy. Today, when technology requires a great cost, countries need to develop their own technological activities and reduce technology imports. In addition, it needs to increase employment in order to train qualified personnel by adapting to developing technologies. Individuals who will adapt to new technologies should be included in the necessary workforce and their training should be provided.

In the literature review and empirical practice, it is seen that the import and export of information and communication technologies, mobile cellular data and the internet have a positive effect on economic growth and employment, and it is necessary to

make the necessary investments and provide infrastructure activities in this area. In addition, technology-oriented strategies and investments to be implemented by public institutions will positively affect the economy.

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