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Research Article

The Relationship Between Digital Marketing, Household Consumption and Output: An Analysis of Türkiye's Economy

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Abstract: Household consumption expenditures have always been one of the main and most important elements of national income in economic literature. With the advancement of technology, the increase in the quality and prevalence of internet usage has paved the way for digitalization in economies and introduced the concept of digital marketing to the literature. Easy access to digital marketing channels via computers, mobile phones, tablets, etc. and the proliferation of alternatives for consumers can affect consumers' purchase intention and thus household consumption and output. From this standpoint, this study aims is to reveal the interrelation between household consumption expenses, digital marketing and GDP per capita for the Turkish economy through an econometric analysis. For this purpose, the study period is 1993-2022 and the preferred method is Non-Linear Autoregressive Distributed Lag Model (NARDL) method, which allows us to see asymmetric relationships and differ positively from other cointegration tests in this respect. The findings show that household consumption expenditures increase GDP per capita. By contrast, a negative linkage was found between digital marketing and output. Considering the existing literature, the notion that the linkage among the variables we have chosen has not been investigated shows the originality of the study.

Keywords: Consumption, Digital Marketing, NARDL

1. Introduction

The desire of countries to grow and develop economically has been going on since the existence of humanity. Especially since the 19th century, with the realization of the industrial revolution, the per capita gross product of countries has been increasing every year (Kaynak, 2007, p. 1). Household consumption expenditures constitute a relatively large of GDP in Turkey. According to the World Bank report in 2024, this ratio 59.44 % of GDP (Trading Economics, 2025).

From a macroeconomic perspective, consumption expenditures constitute a significant portion of GDP per capita. The variability in consumption expenditures is an important tool in achieving basic economic objectives. Therefore, consumption expenditures should be taken into consideration in the determination and implementation of economic policies. Although consumer behavior has psychological dimensions, it is under the influence of macroeconomic variables since it is closely related to income in the economy and includes both current and future forecasts. Therefore, determining the factors affecting consumption expenditure is very important in the formulation of economic policies (Arslan, 2023, p. 301).

Moreover, since consumption expenditures constitute the most important part of national income items, it has been among the most frequently analyzed areas in the field of economics. Firstly, Keynes (1936) established the consumption function with the "Absolute Income Hypothesis" and revealed a linear interaction between income and consumption behavior. According to Keynes, consumption expenditures are a function of disposable income. The incremental tendency of consumption takes a value from 0 to 1, while the average inclination to consume decreases as income increases. Consumption is governed by income, the effect of interest is insignificant, consumption will increase as the income of the individual increases, and national income will increase with the increase in consumption. Keynes' consumption function is as in equation 1;

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$C=C_0+cY \qquad C_0>0 \quad \text{and} \quad 0<c<1$ (1)

Where C_0 is autonomous consumption, Y is disposable income and c is the marginal propensity to consume.

$APC=C/Y$ (2)

APC refers to the average propensity to consume, and it is assumed that the average propensity to consume will decrease with the increase in income (Mankiw, 2010, pp. 513-514).

Following Keynes (1936) and Duesenberry (1949) with his Relative Income Hypothesis, Friedman (1957) with his Permanent Income Hypothesis, Ando and Modigliani (1963) with their Lifetime Income Hypothesis contributed to the formation of economic literature on consumption theory.

With digitalization, strategies for products and services are changing and digital marketing maintains its role a critical role in the success of big businesses. The change that started with digitalization is supported by the widespread availability of the internet, the proliferation of mobile devices and consumer-brand interaction. However, the increase in e-commerce volume also affects national economies (Chaffey & Ellis-Chadwick, 2019; Kotler & Keller, 2021).

Considering this aspect, this research seeks to examine the interrelations among household consumption expenses, digital marketing and GDP per capita for the Turkish economy for the period 1993-2022 and to reveal them through an econometric analysis. The preferred method for this purpose is the Nonlinear Bound Testing (NARDL) method, which helps to reveal the relationships between variables asymmetrically. It is taken into account that the short or long-term effects of the variables specified within the model may be asymmetric. The NARDL model allows us to reveal the linkages between the dependent and independent variables asymmetrically. By separating the negative and positive effects, it allows us to see how a 1% increase and decrease in the independent variable affects the dependent variable. Therefore, it differs from traditional cointegration tests.

In the study, GDP per capita is taken as the dependent variable. The first independent variable is the number of internet users, which represents digital marketing, and the other is household consumption expenditures.

The plausible contribution of the paper enriches the literature can be summarized as detailed below; A review of prior research highlights that there is a limited number of studies that assess the role of digital marketing and household consumption on GDP. Therefore, it is thought this research aims to enrich literature by responding to this gap. In addition, the method used in the study is superior to traditional cointegration tests in terms of revealing asymmetric relationships.

The remainder of the study is presented as follows; section two is the conceptual framework including explanations about the variables, section three is the literature review, section four is the analytical results based on empirical data, and section five provides the conclusion and recommendations.

2. GDP per Capita, Household Consumption and Digital Marketing

GDP per capita stands as one of the most critical factors that show how developed the nation’s economy -related systems are and reveal the growth potential of that country's economy (Yüce et al., 2013, p. 192). Consumption expenditures, one of the main items that make up the GDP per capita, have a very important place for the development of economies (Kim, 2017; Radulescu et al., 2019). Especially in most countries, consumption expenditures of households correspond to a large portion of GDP per capita, and finding the reasons affecting these expenditures can be a guide in shaping economic policy (Arslan, 2023, p. 287).

Households are of great importance in the economies of countries, and their main function is consumption. The income earned by households and their consumption can be seen as an indicator of

the welfare of countries. Especially in macroeconomic terms, income and consumption of households are important. Taxes obtained from households' income and expenditures and the support provided to social institutions also contribute to economies (Verter & Osakwe, 2014, p. 733).

Changes in consumption expenditures are very important for national economies in macroeconomic terms. One of the reasons for this is that it is considered as one of the items showing the total savings level in capital formation. At this point, the level of consumption and savings occupy a critical place in the long-term production of countries. The other reason is that consumption is an indicator of both total consumption expenditures and macroeconomic values due to its effect on total production (Ezeji & Ajadua, 2015, p. 164). The increase in consumption expenditures after demand also provides changes in the income level and has economic effects on the welfare share of countries. Due to this change in the share of welfare in the economies of countries, consumption expenditures are used as a basic indicator of the economy and summaries the course of economies (Koçak & Karış, 2023, p. 284).

Determining what increases or decreases consumption expenditure is very important in terms of economic growth, employment, formulation of production strategies, determination of public expenditures and economic policies of countries. Factors shaping consumption expenditures may also affect consumer behavior. Factors such as developments in technology, trends, widespread use of the internet may lead to changes in the purchasing behavior of consumers. Manufacturers should closely follow the trends of consumers and develop products/services and marketing strategies accordingly (Kebapçı & Hatırlı, 2023, p. 146).

In order to reveal the sub-items of household consumption for Türkiye, to learn the socio-economic structure of households and how their consumption tendencies are shaped, surveys have been routinely conducted by TURKSTAT since 2002, and these surveys are also used in determining important macroeconomic variables such as the expenditure variables to be part of the end-user price index, estimation of ultimate consumption outlays in national income estimation, poverty line and minimum wage (TÜİK, 2020, p. 4).

Another variable used in the study is Digital Marketing. Digital marketing is considered as a marketing framework that promotes products and services in the business world over the internet with the development of technology and the internet. Digital marketing can be considered as all marketing operations executed with the contribution of digital platforms in the internet surroundings (Ayush et al., 2020).

Web 1.0, the first stage of the internet, was a non-mobile internet technology that put users in a certain mound. Later, with the transition Following the development of Web 2.0 technology, the internet has become a more mobile and efficient technology for its users (Kapan & Üncel, 2020). The use of the internet, which has developed with Web 2.0 technology, has led to the emergence of the concept of digital marketing, which is the basis of entrepreneurship. With the increase in internet usage, people spend approximately 7 hours a day on internet usage. With the intensive use of the internet, digital marketing applications have become increasingly important (Datareportal, 2023, as cited in Yüksel, 2023, p. 122). With the transformation of internet technology into a marketing tool, people can interact with each other more and can easily access the information they want at any time and place (Nuseir et al., 2023).

All the contents that make up the technology are transferred to the digital world and stored in the computer environment. When we look at the characteristics of digital technologies, it is understood that there are mutual interaction, speed and control. Brands also use social media and search engines to retain their existing customers and acquire new customers. These channels are also called digital channels and are also referred to in the literature as internet marketing or network marketing (Turhan, 2023, p. 2).

With the proliferation of digital capabilities and the increasing use of digital technologies, the access of individuals and society to products/services is becoming easier and faster. Thanks to digital technologies, consumers can shop from a wider pool. Receiving feedback from consumers in after-sales services contributes to product/service development (Özaktaş, 2023, p. 99). Studies on marketing in digital environment are rising continuously. It is conceivable to apply the necessary marketing strategies to consumers before, during and after sales thanks to the interaction provided by the internet. Reaching almost all consumers through digital applications and the internet has required all areas of marketing to update itself (Chaffey & Smith, 2012).

Looking at the observations from the research implemented to evaluate the rate of household ICT usage, the rate of internet usage of households with the opportunity to access the internet at home in 2023 increased by 1.4 points compared to 2022 and reached 95.5 per cent (TÜİK, 2023):

Digital marketing is a marketing approach that tries to reach and interact with consumers through the internet. While it is difficult to personalize and measure consumer behavior in classical marketing approaches, it is much easier in digital marketing approaches. Thanks to the transactions made by consumers over the internet, online behaviors of consumers can be determined, and marketing strategies can be developed accordingly (Topsakal, 2023, pp. 92-93).

Marketing activities have been subjected to major evolutions over time. Thanks to the developments in the digital field, the business world has also had to change. Businesses have made consumers their focal point to gain competitive advantage and create sustainable profitability. To respond to the demands of consumers, it is necessary to adapt digital technologies to all stages of marketing activities. In this respect, digital marketing is increasing its impact day by day. (Leblebici et al., 2024, p. 147).

With the recent developments in technology, the business world, production and consumption stages, as well as social life, continue to change. This change involves households, society and businesses managing their activities through digital platforms. With digital platforms, households can make their daily lives easier and make a difference in the way they consume, communicate, serve and do business. Increasing use of the internet, widespread use of smart devices, payment and shopping opportunities through digital platforms are indicators of digital change affecting household consumption. By adapting to the digital world, households can make their lives easier and increase the speed of access to products and services (Özaktaş, 2023, p. 86).

Market uncertainties that consumers are exposed to can affect their purchasing behavior. One of these is product and service accessibility. Consumers can easily access products and services thanks to internet usage and digital marketing. Difficulties encountered before, during and after the purchase also affect the choice of products and services. Other factors that facilitate consumer purchasing are those related to the macroeconomy. GDP per capita affects consumption (Zhang et al., 2021).

As seen in the literature above, household consumption and GDP have a very essential role in fostering national economic growth. If GDP is high, household expenditures may also increase. The expenditures made by households can also be decisive in analyzing consumption data. When we look at the reasons for the recent increase in consumption, digitalization and consumers' easy access to products and services may be some of the reasons for this. With the digital marketing practices that have developed with digitalization, consumers can easily meet their needs from anywhere and at any time. This may naturally lead to increased consumption. For this reason, the relationship between the variables we have discussed in this study can contribute to future studies both theoretically and practically.

3. Literature

When literature is analyzed, the number of studies in which household consumption, digital marketing and GDP per capita variables are combined are limited. Therefore, to provide a clearer theoretical and empirical background, studies examining the relationships between these variables are summarized below.

Choi and Yi (2009) analyzed the interaction between internet use and economic expansion in 207 countries for the years 1991-2000 and indicated that internet usage positively has an impact on economic growth

In his study, Fang (2011) tried to measure the amount on the role of renewable energy consumption in economic well-being by using Cobb-Douglas style productive functions. Using OLS and SPSS program with the data obtained in China between 1978 and 2008, the study shows that the increase in increased renewable energy consumption leads to growth in GDP per capita and real GDP rural and urban household annual income, while the portion of energy consumption derived from renewable sources does not affect overall economic health.

Yasmeen and Tufail (2015) investigated the effects of internet utilization on economic expansion for South Asian countries using the Panel ARDL method and concluded that internet use enhances economic growth in the long run.

Billon and colleagues (2018) analyzed the connection between internet use and economic expansion across 94 countries using Panel Data analysis and demonstrated that internet usage negatively plays a role in the economic growth of low-income countries, but positively in middle and high-income countries.

Iheonu and Nwachukwu (2020) aim to identify the macroeconomic variables affecting household consumption in some West African countries. In the study, which was modelled between 1989-2018, an augmented mean group procedure that considers heterogeneity and cross-sectional dependence was used. According to the results, GDP per capita and credit utilized by the private sector have been found to significantly improve household consumption in the identified countries. In addition, the results for specific countries differ in terms of the magnitude of the coefficient and the significance of the regression. Economic policy implications of the findings are also discussed.

Mourad and Trabulsi (2020) examined the link between per capita GDP, household final consumption expenditure per capita and per capita consumption outlays in Singapore between 1991-2017. In the study, Two Stage Least Squares, Limited Information Maximum Likelihood and Hausman test and Three Stage Least Squares equations were used, and it was observed that all three structural equations were defined and there was a robust positive connection between the variables.

Parishev and colleagues (2020) investigated the contribution of e-commerce with regard to economic growth in 31 European countries with panel data analysis and found that e-commerce plays a positive role in the development and progress of countries.

Koç (2021) analyzed the effect of national income level the effects of per capita and household size on electricity consumption consumption in 81 provinces within the scope of NUTS level 3 for the period 2008-2018 and found that while national income level per capita plays a positive role in electricity demand, household size has a negative effect on electricity demand.

Yurgiden (2023) theoretically analyzed the contribution of digital economy on the economic advancement of nations, and by examining the studies in sites such as Scopus, Taylor and Francis Group, ProQuest eBook Central, Science Direct, it was concluded that the digital economies of developed countries such as the USA, the United Kingdom and Canada as well as developing countries such as China, India and Indonesia can contribute to their economic growth.

Wu (2025) stated that digitalization has established itself as the driving force of China's economic development. In his research, he aimed to investigate the groundbreaking effect of digitalization on Gross Domestic Product (GDP). In the study, he used the expenditure-based GDP method to examine the impact of digitalization on consumption expenditures, investment and exports. Looking at the outcomes of the research, which used qualitative analysis method, it was concluded that digitalization is important for economic development and digitalization should be utilized to increase GDP.

4. Empirical Analysis

4.1. Data and methodology

In this study, the effect of household consumption expenditures, digital marketing and GDP per capita in the Turkish economy is analyzed nonlinearly with the NARDL method using annual data for the period 1993-2022. The study used quantitative research methods. The data used is compiled from the World Bank database and included in the analysis in logarithmic form. All information about the variables is presented in Table 1.

Table 1

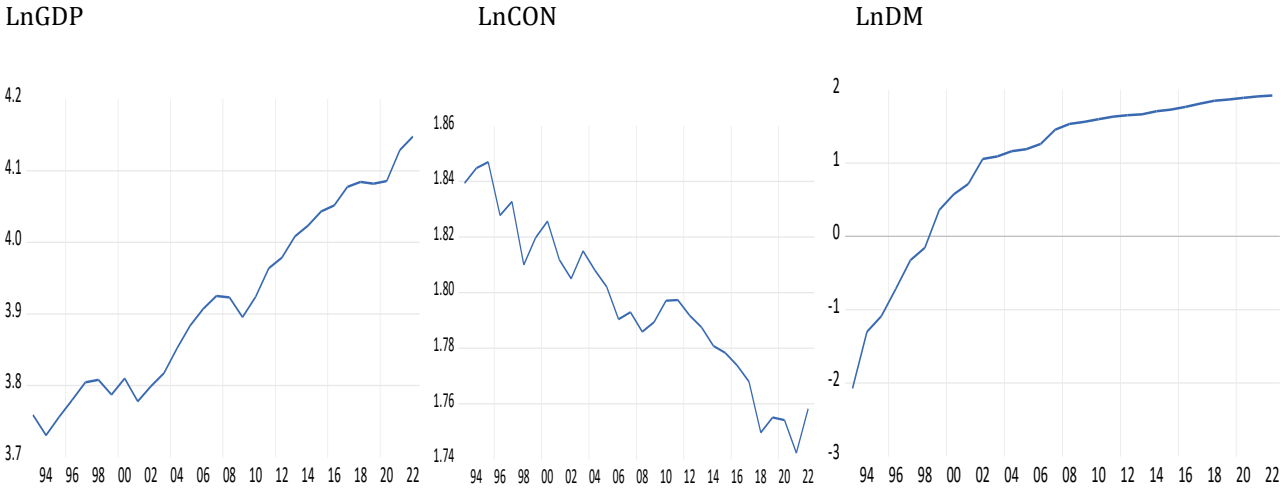
Descriptions of Variables

Variables	Identification	Source
GDP per capita	LnGDP	World Bank
Internet Users	LnDM	World Bank
Household consumption expenditure	LnCON	World Bank

Table 1 provides explanations of the variables. GDP per capita is taken as the dependent variable in the study. The first independent variable is the number of internet users, which represents digital marketing, and the other is household consumption expenditures. The selection of these variables included in the analysis was made following the literature and their time path graphs are presented in Figure 1.

Figure 1

Time Path Graphs of Variables



The model was established in the study;

$$LnGDP=\alpha_1 + \beta_1 LnDM_t + \beta_2 LnCON_t + \varepsilon_t \quad (3)$$

In equation 3, LnGDP is GDP per capita, LnDM is digital marketing, LnCON is final household consumption expenditure and εt is the pure random error process.

Non-Linear Autoregressive Distributed Lag Model (NARDL) proposed by Shin et al. (2014) allows the estimation of short and long run asymmetric relationships and the variables are decomposed into positive and negative components. The fact that the series are stationary at I(0) or I(1), i.e. at different levels, does not constitute a constraint for the NARDL method. However, if the stationarity levels of the variables are I(2), the NARDL model cannot be used.

For any x sub t explanatory variable x sub0;

$$e_i^+ = max\,(e_i,0) \qquad e_i^- = min\,(e_i,0) \tag{4}$$

$$x^t = x_{t-1} + \quad e_t = x_0 + \text{å}_{i=1}^{t} \qquad e_i = x_0 + \text{å}_{i=1}^{t} \qquad e_i^+ + \text{å}_{i=1}^{t} e_i^- \tag{5}$$

$$x^+ = \text{å}_{i=1}^{t} \quad e_i^+ \qquad and \quad x^- = \text{å}_{i=1}^{t} \quad e_i^- \tag{6}$$

Equations 4 and 5 decompose the series into positive and negative components. In equation 6, x+ denotes positive effects and x- denotes negative effects. The long-term cointegration relationship in the NARDL model can be shown as in equation 7.

$$y^t = \sigma^+ x_t^+ + \sigma^- x_t^- + \mathrm{u_t} \tag{7}$$

The null hypothesis that there is no cointegration relationship between the variables is upper case H_0: $\delta = \vartheta^+ = \vartheta^- = 0$ and the alternative hypothesis is H_1: $\delta \neq \vartheta^+ \neq \vartheta^- \neq 0$. In the long-run asymmetry test, long-run multipliers are $L_{op}^+ = \vartheta^+ \,/\, -\delta$, $L_{op}^- = \vartheta^- \,/\, -\delta$, and δ =0 is interpreted as no asymmetric relationship in the long run. Short-term asymmetry is again tested with the Wald test, and its formulation is as in equation 8.

$$\sum_{i=1}^{m-1} \vartheta_{t-1}^+ = \sum_{i=1}^{m-1} \vartheta_{t-1}^- \tag{8}$$

Equation 9 expresses the NARDL model including positive and negative effects. The superscripts (+) and (-) denote the decomposed positive and negative parts, respectively, Δ denotes the difference operator, subscript base, upper case E upper case C, last base, bottom, t minus 1 last subscript denotes the one period lagged value of the error terms series found by cointegration. In this context, short run coefficients;

$$lnGDP = \alpha_0 + \sum_{i=1}^{n} \propto_{1i} \Delta LnGDP_{t\text{-}1} + \sum_{i=0}^{n} \beta_i \Delta\, LnCON^+_{t\text{-}i} + \sum_{i=0}^{n} \beta_i \Delta\, LnCON^-_{t\text{-}i} + \sum_{i=0}^{n} \propto_{2i} \Delta\, LnDM_{t\text{-}i} + \propto_2 EC_{t-1} \tag{9}$$

Finally, the long-run relationship between the variables is as shown in equation 10.

$$LnGDP_t = \alpha_0 + \sum_{i=1}^{n} \propto_{1i} \Delta LnGDP_{t\text{-}1} + \sum_{i=0}^{n} \beta_i \Delta\, LnCON^+_{t\text{-}i} + \sum_{i=0}^{n} \beta_i \Delta\, LnCON^-_{t\text{-}i} + \sum_{i=0}^{n} \propto_{2i} \Delta\, LnDM^D_{t\text{-}i} + \varepsilon t \tag{10}$$

4.2. Findings

In time series analyses, it is important to test the stationarity of the series. For the NARDL method to be used in this study, although the stationarity of the series at I(0) or I(1) does not constitute a constraint, it cannot be used in series stationary at I(2) level. Therefore, stationarity tests for the series used in the analysis with ADF and PP unit root tests are performed and reported in Table 2.

Table 2

Unit Root Test Results

Variables	Constant Models		Constant and Trended Model	
	Level	First Difference	Level	First Difference
		ADF Test Results		
LnGDP	0.581	-5.541***	-2.633	-5.440***
LnDM	-0.851***	-	-4.182**	-
LnCON	-1.045	-7.177***	-3.744**	-
		PP Test Results		
LnGDP	1.614	-5.911***	-6.443***	-
LnDM	-12.749***	-	-6.292***	-
LnCON	-1.045	-7.884***	-3.764**	-

***Note*:** *. ** and *** indicate that the related variable is stationary at 10%, 5% and 1% significance level, respectively.

When Table 2 is analyzed, according to ADF test results, LnDM variable is stationary at level and other variables are stationary when differences are taken, while according to PP test, LnGDP is stationary when differences are taken, and other variables are stationary at level. Situations such as cyclical fluctuations in economies, unexpected wars and elections may cause some structural breaks in the series. At this point, it would be appropriate to conduct unit root tests with structural breaks. The LM birefringent unit root test developed by Lee and Strazicich (2003) was conducted and reported in Table 3.

Table 3

Single Break LM Unit Root Test Results: Model Crash A

Variables	$S_{(t-1)}$	T_B	K
LnGDP	-2.278	2003;2006	0
LnDM	-3.300	2004;2010	8
LnCON	-5.659***	2005;2010	7

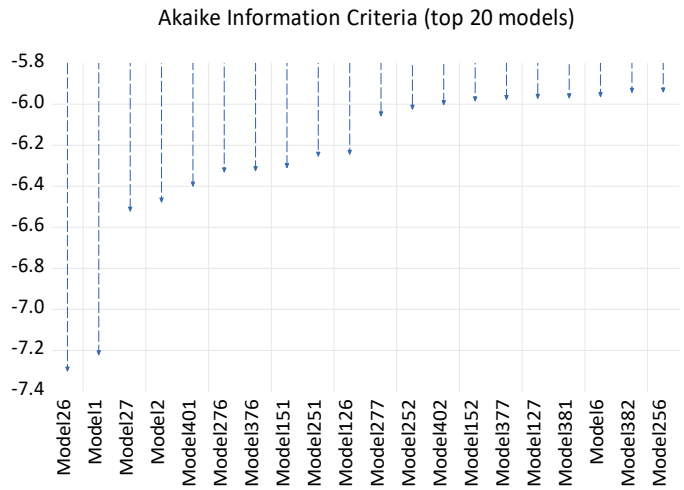
Note: *. ** and *** indicate that the related variable is stationary at 10%, 5% and 1% significance level, respectively, S(t-1) indicates critical values, TB indicates break dates, and K indicates lag values. Critical values are -4.073 (1%), -3.563 (5%), -3.296 (10%)

When Table 3 is analyzed, LnCON variable does not contain unit root with structural break, while other variables contain unit root with structural break. The conventional and structural break unit root results show that the NARDL model can be applied.

The next stage of the analysis is to determine whether there is a long-term cointegration relationship between the variables. For this purpose, the appropriate length should be determined first. The lag length calculated according to the Akaike information criterion is shown in Table 4.

Table 4

Appropriate Lag Length



When Table 4 is analyzed, the most appropriate model specification selected by the Akaike information criterion in determining the lag length is NARDL (4,3,4,4,). To determine whether there is a long term cointegration relationship between the variables, the F test statistic value should be greater than the table values in Pesaran and colleagues (2001). F test results are reported in Table 5.

Table 5

F Test Results

Test Statistic	**Value**	**k**
F-test	8.945	3
	Critical Values	
Significance Levels	**Lower Limit**	**Upper Limit**
10%	2.72	3.77
5%	3.23	4.35
1%	4.29	5.61

Note: Here k is the number of independent variables in the model. The number of lags is 4 according to the Akaike criterion of Eviews 12.0 package programme

F test results are presented in Table 5. The F test value is 8.945 and a cointegration relationship is detected between the relevant variables at 1% significance level. This result allows for the next stage of the analysis.

Table 6

NARDL Findings (4,3,4,4,)

Variables	Coefficient	t-Statistics	Probability
Panel 1. Long Run Coefficients			
LnCON+	17.510**	3.203	0.018
LnCON-	-0.075	-0.045	0.965
LnDM	-0.295***	-4.043	0.006
Panel 2. Short Run Coefficients			
D(LnCON+)	1.646**	3.611	0.011
D(LnCON+ (-1))	-2.476**	-3.146	0.019
D(LnCON+ (-2)	-5.459***	-7.783	0.000
D(LnCON-)	-1.490***	-5.081	0.002
D(LnCON- (-1))	0.133	0.301	0.772
D(LnDM)	-0.073***	-3.749	0.009
D(LnDM(-1))	0.010	0.635	0.548
D(LnDM(-2))	-0.210***	-12.531	0.000
CointEq(-1)*	-0.324***	-7.326	0.000
C	1.188***	-7.476	0.000
Panel 3. Diagnostics Tests			
Otokorelasyon-Breusch-Godfrey LM test; 2.744 (0.177)			
Change Varyans-Heteroscedasticity test; 0.597 (0.815)			
Normallity-JB Normality test; 1.845 (0.397)			
Ramsey-Reset test; 0.225 (0.830)			
R= 0.975 R^2= 0.935			
D.W.=2.377			
W_{LR}= 7.352***(0.000)			
W_{SR}=-1.330 (0.210)			

Table 6 consists of three panels. The first panel contains the long-run coefficients of the analysis, the second panel contains the short-run coefficients, and the third panel contains the diagnostic tests. When we analyze the long-run coefficients, there is a positive and statistically significant relationship between the positive effect of household consumption expenditures and per capita output. We can say that when household expenditure increases by 1 per cent, per capita output increases by 17.5 per cent. There is a negative relationship between the decrease in household expenditure and output per capita. In other words, when household expenditure decreases by 1%, the output per capita increases, but this increase is 0.07%. However, this finding is not statistically significant. There is a negative relationship between digital marketing variable and per capita GDP at 1% significance level. This finding can be interpreted as a 1% increase (decrease) in digital marketing decreases (increases) per capita output by 0.2%.

When we look at the short-run coefficients, we see that the error correction coefficient is negative and statistically significant. This finding means that the error correction model works. There is a positive relationship between the positive effect of household consumption expenditures and per capita output at 5% significance level. In other words, increases in household consumption expenditure increase

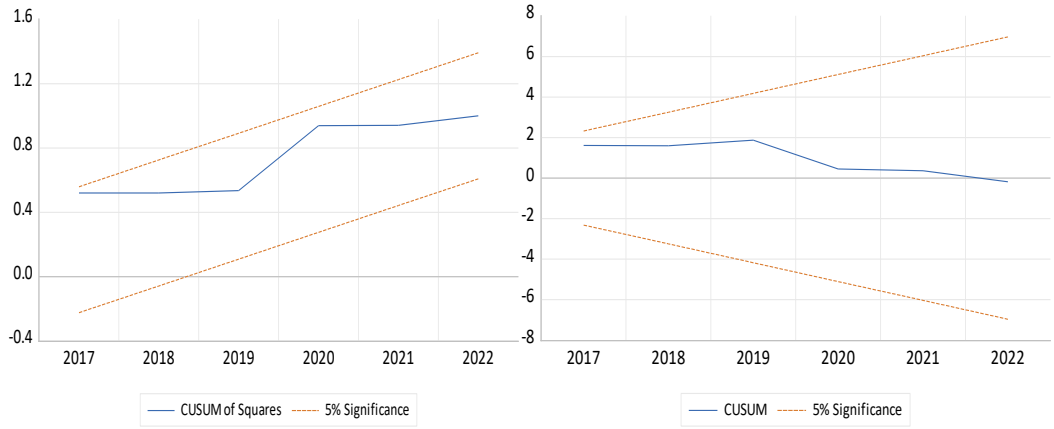
output in the short run and this finding is consistent with the long run coefficients. On the other hand, there is a negative and statistically significant relationship between household consumption expenditures and output. In other words, a decrease in household consumption expenditure increases output by -1.49 in the short run. Our last variable, digital marketing and output, has a negative and statistically significant relationship in the short run. A 1% increase in digital marketing decreases output by 0.07%. All the findings are consistent with the long-run results.

When we examine the diagnostic tests in Panel 3, the R2 value is 0.93 and the explanatory power of the model is quite high. The model does not have any changing variance problems, autocorrelation problems and specification errors. Moreover, when we look at the results of the "Wald" test, it is proved that there is an asymmetric relationship between household consumption expenditures and output in the long run at 1% significance level. Therefore, this result means that in the long run, the effect of increases in household consumption on output is not the same as the effect of decreases in household consumption on output. It is not possible to say the same for the short-run asymmetry test. Because the short-run asymmetry relationship could not be proved because of the test.

Finally, Figure 2 reports the CUSUM test and CUSUMQ test results in panels a and b. The graphs show that the consecutive residuals and consecutive residual squares are within 95% confidence limits, supporting that the model coefficients are stable.

Figure 2

(a) CUSUMQ2 test 5% significance level (b) CUSUMQ test 5% significance level



5. Conclusions and Recommendations

Consumption expenditures play a key role as one of the most important variables in macroeconomic analyses and are the subject of many economic studies. Both public and private consumption expenditures are positively affected by real increases in national income and can show a two-way causality link between national income and consumption Considering that consumption expenditures can increase national income by increasing the supply of goods and services, it would not be wrong to say that national income is a function of consumption. On the other hand, the evolution of information communication technologies and the common utilization of the internet, and the development of the concept of digital marketing stimulate both demand and production, often positively affecting growth and welfare increase.

In this regard of view, this research seeks to reveal the relationships between household consumption expenditures and digital marketing and GDP per capita in the Turkish economy. The method included in this research is the NARDL method, which allows us to reveal non-reciprocal relationships between variables, and the period of the study is 1993-2022.

Household consumption expenditures are taken to represent the consumption variable, the level of internet usage is taken to represent the digital marketing variable, and the GDP per capita variable is

taken to represent output. The findings of the analyses indicate that there exist positive and statistically substantial relationships between household consumption expenditures and GDP per capita across short-term and long-term horizons. In this case, it can be said that increasing GDP per capita by implementing policies that increase consumption will lead to an increase in welfare, but in an economy like Türkiye that struggles with the problem of inflation, the priority should of course be the implementation of anti-inflationary policies. While implementing anti-inflationary policies, it should not be ignored that the improvement in the incomes of the minimum wage earners in Türkiye may contribute to economic growth and welfare increase by increasing their consumption levels, considering that the number of minimum wage earners in Türkiye is very high and they spend more on food. Policy makers should not forget that by increasing the income level of economic individuals, they can increase their consumption expenditures as well as their socio-cultural development.

From a different perspective, it is noteworthy that there exists a negative and statistically significant link between digital marketing and per capita GDP both across short-term and long-term horizons. This finding can be considered as evidence that technological advances do not always exert a positive impact on output. In the economic literature, this situation can be explained by Solow's productivity paradox. Especially in developing countries, despite the increase in technological developments and internet usage, productivity decreases, and output is negatively affected by this situation. There are studies in literature that have obtained findings parallel to these findings (Noh & Yoo, 2008; Maurseth, 2018; Bakari & Tiba, 2019; Çoban, 2020).

When all the findings are evaluated together, the main policy recommendation of the study can be summarized as policies that support consumption by increasing the income of at least minimum wage earners, provided that inflation is prioritized, and in addition, determining the factors that cause Solow's productivity paradox and implementing a set of policies that will increase the welfare of the people through technological developments and the increase in internet usage, and at the same time help to achieve a stable economic growth trend.

Like all studies, this research also has certain limitations. The biggest a constraint of this research is that the data set for Internet usage only covers the period from 1993 onwards. Considering that the concept of digital marketing is also a new concept, the number of measurable variables that can represent it is quite limited. Of course, the concept of digital marketing is not a variable that can be explained by the number of internet users alone. However, for a variable to be subject to an econometric analysis, it must be measurable, and this measurement must be made in a regular time interval. In future studies, these limitations can be overcome in time and much more comprehensive analyses can be made with a much larger data set in this field.

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