## ELECTRONIC COMMERCE AND ECONOMIC GROWTH IN SAUDI ARABIA

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**Abstract**

*The study aims at determining the impact of electronic commerce on national economic growth in Saudi Arabia during the period (2001-2013). The study uses an econometric model to get empirical research between E-commerce development and economic growth using the latest data of Saudi E-commerce development. The regression estimation shows that capital-labor ratio, the size of the private sector, Terms of Trade, number of business transactions via internet, information and communication technology expenditure, and the number of credit cards (as a method of payment) have significant and positive impact on economic growth, while the size of public sector has significant and negative impact on economic growth. The study recommends that Saudi government, enterprises and consumers need to pay more attrition to E-commerce to increase investment in infrastructure, pushing more internet users to develop online shopping habits so as to improve the overall development level of the E-commerce; thus promoting the effective national economic growth.*

*Keywords: Economics, E-commerce, Econometrics, Growth, Saudi Arabia*

## INTRODUCTION

Economic growth defined as a sustained expansion of potential output as measured by the increase in Real Gross Domestic Product (real GDP) over certain period of time. A large number of studies have emerged that attempt to determine the factors that drive the growth in order to explain the wealth and productivity differences between countries. Most common determinants used are labor, land, capital, technology, knowledge and investments. Nevertheless, the main underlying idea of the growth theory is that growth is driven by technological progress. This takes form of creative destruction which explains most of the dynamics of industrial change. The qualitative change resulting from the creative destruction leads to new goods, new methods of production, new markets and new forms of industrial organization. Technological advances in this market drive the digital economy and this is being seen by the emergence of new goods, new business models as well as new markets. These innovations, in turn, create the basis for E-commerce development.

E-commerce refers to the sale or purchase of goods or services that takes place between businesses, households, individuals, governments, and other public or private organizations and is conducted over computer-mediated networks. Compared with the previous traditional business, E-commerce has several distinct advantages such as fewer links, faster speed and smaller pressure of inventories for enterprises.

During the past ten years E-commerce has emerged as one of the fastest growing sectors in the Saudi Arabia, especially with the growth of the information technology sector; thus Saudi Arabia tops the list of Arab states in terms of the growth of electronic commerce, which amounted to 17.2 billion riyals in conjunction with the increase of users of e-commerce services to 8.2 million users which is equivalent to 29% of the population in 2013. This indicates that Saudi Arabia represents an ideal base for E-commerce market at the level of the Arab region. Moreover, the forecasts state that in the coming years E-commerce will continue to develop at a rapid pace, which, in turn, will have significant effect on the structure and functioning of businesses, sectors and economy as a whole (Saudi Arabian Monetary Agency, 2013). Nevertheless, despite its increasing role in the economy, there is a lack of empirical studies on this phenomenon at a macroeconomic level in Saudi Arabia. Therefore the main objective of the current study is to investigate the impact of E-commerce on the performance of the Saudi economy measured by real GDP during the period (2001-2013).

The study is structured as follows. Section two reviews the relevant literature. Section three overviews the development of E-commerce and Real GDP in Saudi Arabia during the study period. Sections four and five discuss the estimation procedure and present the results respectively. And finally, summery and conclusion are in section six.

## LITERATURE REVIEW

### Review of Economic thought

Business and economy are inextricably linked with the development and implementation of new technology. Growth and development of any modern economy has been recognized by many economic theorists, such as Kondratieff, Schumpeter, Mensch and Porter, to be based on innovation of new technology.

In the early twentieth century, the economist Kondratieff introduced his "Long Wave Theory" of economic growth. He detailed the numbers of years that the economy expanded and contracted during each part of the half century long cycle, which industries suffer the most during the "down wave" and how technology plays a role in leading the way out of the contraction into the next "up wave".

Solow-Swan model (1956) argue that the crucial and decisive role it attributed to the technological progress in driving the growth, hence, implying that growth cannot be sustained without continuous technological change that occurs outside the model, that is, exogenously. As

a result, the long run growth rate in this model is determined entirely by exogenous factors. Moreover, the exogenous technological progress can take on many forms. First of all, inventions can make it possible for the producers to produce the same amount of output by using relatively less capital input or less labor input which is being referred to as capital-saving or Labor-saving technological progress respectively. Building on this theory; the economist Schumpeter (1961) assigned technological innovation an almost exclusive role, as an engine of economic development: the fundamental impulse that sets and keeps the capitalist engine in motion comes from new consumers' goods, new methods of production or transportation, new markets, and the new forces of industrial organization that capitalist enterprise creates.

Mensch (1979) updates the Schumpeter theory, giving it an empirical base in history, where clusters of innovation take place and generate completely new sectors. Mensch stressed that only technological innovations can overcome depression and that governments must implement an aggressive innovation policy to stimulate the search for new and basic innovation. In the beginning of the mid-1980s, Romer incorporated the notion of ideas into the growth theory. Within this model the technological progress is driven by research and development (R&D) activities and takes the form of creating new ideas. Thus, the people are seen as the key input in the production function. Though, output growth is more dependent on factors that occur within the system rather than outside it, also exogenous factors contribute to the growth in endogenous growth models. Models built on the theory of Romer, emphasize also the importance of technology transfer, therefore, the eventual diffusion of technologies is likely to prevent any country of lagging too far behind in its economic development.

Porter (1990) emphasizes that the prosperity and competitive advantage of a nation no longer happens as a result of a nation's natural resources and its labor force, but rather the ability of its industry to innovate and upgrade. This can be seen as a disruptive technology on a macro environmental level. And today, whether economic community subscribes to these economic theories or not, the impact of new technology on the economy of a nation is indisputable. Continuous growth of E-commerce is expected to have a deep impact on structure and functioning of economies at various levels and overall impact on macro economy.

**Review of empirical studies**

The research on E-commerce is growing as fast as internet phenomena itself and it is attracting an increasing international attention. Most of researches can be observed after the year 1995. In this section, we report on some of the recent studies in E-commerce and its impacts at national economy.

Morrison and Siegel (1997) and Helpman (1998) studies find the positive effect of E-commerce on the productivity and the economic performance, through positive externalities of

E-commerce such as: increasing the investment in R&D and human development, and developing the  interrelationships between industries and other sectors that contribute to raise productivity.

Lall (2002), Bartel and Sicherman (2005) and Berman and Machin (2006)  studies find out that E-commerce leads to raise wages and restructures labors market  for  the benefit of technical and skilled workers who have  high educational level. Another study by UNCTAD (2002) emphasizes on the positive impact of the growth of information and communication technology due to the spread of E-commerce to increase employment opportunities for women. Jorgenson and Stiroh (2005) show that E-commerce is an important determinant to improve productivity and economic efficiency, and raise the economic growth rate, where E-commerce leads to raise the investment volume in ICT which in turn leads to raise the productivity and economic growth. While the study of Dedrick  et al.(2003) argued that  E-commerce leads to raise the productivity and economic growth due to it reduces the costs of coordination between economic sectors and improve the standard of management and organization.

Several studies examine the impact of E-commerce on countries' exports through the linkage between the degree of economic openness, trade liberalization, and the degree of using of the Internet. Onyeiwu (2002) suggests that  the "extent to which a country is integrated into the global economy with greater contact, either via trade, tourism or geographical location, with the outside world, are more likely to be advanced in digital technology than other countries". Similarly, Caselli & Coleman (2001) argue that countries open to imports from high-income OECD economies will benefit from knowledge spillover and hence, be more likely to adopt new technologies.

Empirical studies of internet adoption find that internet use is correlated with openness to trade even after controlling for other factors that might correlated with both. For example, Wallsten (2003) and Baliamoune (2002) find that the internet users made up a greater share of the population in developing countries that are more open to trade. Other studies also find that additional measures of ICT use and investment are correlated with various measures of openness. In general the correlation between ICT use and openness is stronger in developing countries than developed.

Several studies like Clark (2001) aims at determining the impact of internet use on exports. Clark uses data from 20 Low-and middle-income countries in Eastern Europe and central Asia. He shows that enterprises with internet connections export more, as a share of their total sales, than enterprises without connections. In addition, using a gravity model of trade, Freund and Weinhold (2000) argue that the internet might help to create global markets for traded goods by reducing the fixed costs associated with exporting. The internet could reduce costs "both directly via organized exchanges with numerous buyers and sellers and indirectly through powerful search engines, which enable sellers to notify buyers of prices

instantaneously. In the second paper, Freund and Weinhold (2002) find that exports of services to the USA grew more quickly for countries with greater internet penetration in a sample of 31 middle- and- high-income countries.

From above we can argue that the emergence and rapid growth of internet and E-commerce have strong implications on economic. It is quite possible that these new technologies might transform the future of the economic and societal landscape. At the economic front, there is clear evidence that E-commerce and internet technology have positive impacts. Based on the prior works in the available literature, the current study will intend to apply the growth theory in order to examine the impact of E-commerce on Economic growth in Saudi Arabia.

## E-commerce and real GDP in Saudi Arabia: An overview

### E-commerce development in Saudi Arabia

Over the past decade, the Saudi Arabia has taken measured but strong steps towards developing a diversified economy, with emphasis on developing its information Technology sector. A core issue has been the introduction of robust  E-commerce initiatives throughout the country spanning both vertical Business-to-Consumer (B2C) and lateral Business-to-Business (B2B) market systems. This section briefly documents the world Saudi Arabia's E-commerce indicators development   during the study period.

### Direct indicator of E-commerce

E-commerce has grown rapidly since the first users started to browse the worldwide web in search of goods and services. Today, sales realized over the internet represent a significant proportion of overall commercial sales. In 1991, the internet had less than 3 million users around the world and its application to E-commerce was non-existent. Almost a decade later, by 2001, an estimated 300 million users accessed the internet and approximately one quarter of them made purchases online from E-commerce sites, worth approximately  $2893 billion, and it raised to$38412 billion in 2012 (UNCTAD, 2012)

The growth of E-commerce volume indicates that rising trend of the global economy adoption on the E-media in the completion of commercial and financial transactions. According to geographic distribution of E-commerce volume, North America still has the largest share of the volume of E-commerce in the world (USA share is 47%). While the shares of the Asia-Pacific region and Western Europe, Latin America are 24.3 % and 22.1 % and 1.9 %, respectively, as shown in table (1).

Table (1) Geographical distribution of E-commerce (2001&2012)

| Region | 2001 | | 2012 | |
|---|---|---|---|---|
| | Volume Billion $ | % | Volume Billion $ | % |
| The world | 2893 | 100 | 38412 | 100 |
| North America | 2114.7 | 73.1 | 19551 | 50.9 |
| Asia and Pacific | 309.5 | 10.7 | 9334 | 24.3 |
| Western Europe | 428.1 | 14.8 | 8489 | 22.1 |
| Latin America | 26.03 | 0.9 | 729.8 | 1.9 |
| Central and Eastern Europe | 11.57 | 0.4 | 268.9 | 0.7 |
| Africa | 3.1 | 0.05 | 38.4 | 0.1 |

Source: Data calculated from UNCTAD reports, Different issues

Regarding to Saudi Arabia, there is steady growth in the volume of electronic trade during the period under study, which rose from about 4.2 billion riyals to 17.2 billion Saudi riyals by the end of 2013, with an annual growth rate 25.8%, as shown in figure (1), The Saudi Arabia E-commerce volume represents 0.04 % of the worldwide total volume of E-commerce.

Figure (1) E-commerce volume development in Saudi Arabia(2001-2013)
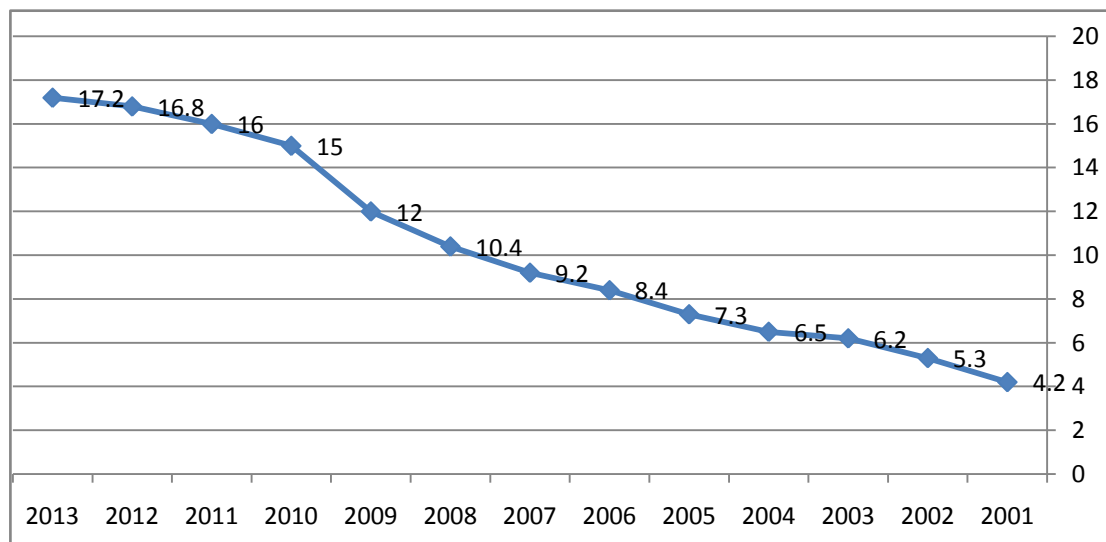


Source: Ministry of Communications and Information Technology, KSA, Annual reports

### Indirect indicators of E-commerce

These indicators include the number of internet users, internet hosts, subscribers in fixed and mobile phones, and personal computers.

### Internet users

The first decade of the new millennium witnessed a profound change and dramatic increase in the way business and trade takes place electronically. Each day, more users in developing countries are accessing the internet through terminals. A growing percentage of users are now also accessing the web through mobile technology and using mobile applications. (WTO, 2013)

The internet services in Saudi Arabia significantly accelerated during the period under study, due to the growing demand on this service and the high awareness of its importance, in addition

to lower costs for access to internet services and development in ICT sector. Internet penetration rate increased at a high rate during the years of the study, it rose from 5% in 2001 to 54.1% by the end of year 2013.  The estimated number of Internet users in Saudi Arabia in 2013 is 15.8 million people, compared to only one million in 2001, as shown in Table (2). It is expected that the demand for internet services in the Saudi Arabia will increase significantly in the coming years as a result of the availability of fiber optic networks (FTTX) that offer high speed associated with growing assistance factors that support the online content, and the spread of Smart devices that content programs and applications based on the Internet connection. (Communications and Information Technology.2013: 5-6)

Regarding to the world, ITU recent reports show that the number of internet users is growing at higher rate, where it rose from 601 million internet users to more than 2.5 billion people by the end of 2013. Moreover, the annual growth rate of internet users in developing countries (32%) is higher than the annual growth rate of internet users in developed countries (24.3%), however, developed countries still continue to surpass developing countries in terms of number of connections.

Table (2) Development of internet user t in the world and Saudi Arabia (2001-2013)

| Years | The world (Billions) | Growth rate % | Developed countries (Billions) | Developing countries (Billions) | Saudi Arabia (Millions) | Growth rate % |
|-------|------|------|------|------|------|------|
| 2001 | 0.601 | - | 0.387 | 0.214 | 1 | - |
| 2002 | 0.623 | 4 | 0.407 | 0.219 | 1.4 | 40 |
| 2003 | 0.666 | 7 | 0.407 | 0.259 | 1.5 | 7.1 |
| 2004 | 0.749 | 12.4 | 0.457 | 0.292 | 2.4 | 60 |
| 2005 | 0.831 | 10.9 | 0.507 | 0.324 | 2.54 | 5.8 |
| 2006 | 0.923 | 11 | 0.563 | 0.360 | 4.8 | 22.1 |
| 2007 | 1.1 | 19.2 | 0.671 | 0.429 | 4.7 | 38.7 |
| 2008 | 1.4 | 27.3 | 0.854 | 0.546 | 5.3 | 23.2 |
| 2009 | 1.82 | 30 | 1.11 | 0.710 | 7.76 | 46.4 |
| 2010 | 2.39 | 31.3 | 1.46 | 0.930 | 9.8 | 26.3 |
| 2011 | 2.58 | 8 | 1.52 | 1.06 | 11.4 | 16.3 |
| 2012 | 2.74 | 6 | 1.61 | 1.13 | 13.6 | 19.3 |
| 2013 | 2.83 | 3.3 | 1.69 | 1.14 | 15.8 | 16.2 |

Source: Data calculated from UNCTAD reports, and annual reports of ministry of Communications and Information Technology, Saudi Arabia

*Internet hosts*

The number of Internet hosts is another commonly indicator referred metric of internet growth for making business transactions via E-commerce. A host is a domain name that has an IP address (record) associated with it. Internet surveys of hosts and servers provide one indicator of comparative internet development between countries. The main limitations in these surveys is the inability to reach all hosts or servers, and the structure of the domain name system being

such that there is no guarantee that all hosts under a particular domain are located in a certain geographic location.

The recent report of Nercraft company for leading hosting providers' sites show that there are more than 234 million internet hosts in 2012 compared with 62 million hosts only in 2001, while it did not exceed 5 million hosts in 1995. Nercraft's report illustrates that USA tops the list with 75 million hosts; Germany comes in the second rank with 20 million hosts. UK, Canada and France have 9, 5.5 and 3.8 million hosts, respectively. Regarding to Saudi Arabia, Despite the number of its internet hosts increased from530 hosts in 2001 to 1740 hosts in 2012, its less than some Arab countries such as: Lebanon (5201), Oman (5678), Jordon(2885), Kuwait (3937), Morocco (2554), Egypt(2010), and Bahrain(2342) (ITU, Annual Reports)

*Subscribers in the fixed-line and mobile*

The telecommunication indicators, such as; the availability of fixed lines, the cost of calls and waiting lists for telephone services reflect the community's willingness to log on the internet and get the advantages of E-commerce. Moreover, mobile phones are increasingly playing a larger role in the expansion of E-commerce in developing countries, especially among users without terminal connections. Figure (2) shows the number of subscribers in the fixed-line and mobile in Saudi Arabia increased during the study period where:

- The number of number of subscribers in the fixed-line between 2001 and 2013 grew from less than 3.3 million to more than 4.8 million, with annual growth rate 5% which is greater than the world annual growth rate (1.9%)
- The number of subscribers to mobile services in 2013 is 53 million subscribers, compared with 3 million subscribers in 2001. With annual growth rate of 135% on average.
- The diffusion index of mobile phones (as a means of supporting and the spreading E-commerce) rose from 12% in 2001 to approximately 181.6% in 2013.

Figure (2) Number of Telephone fixed lines and mobiles (millions)
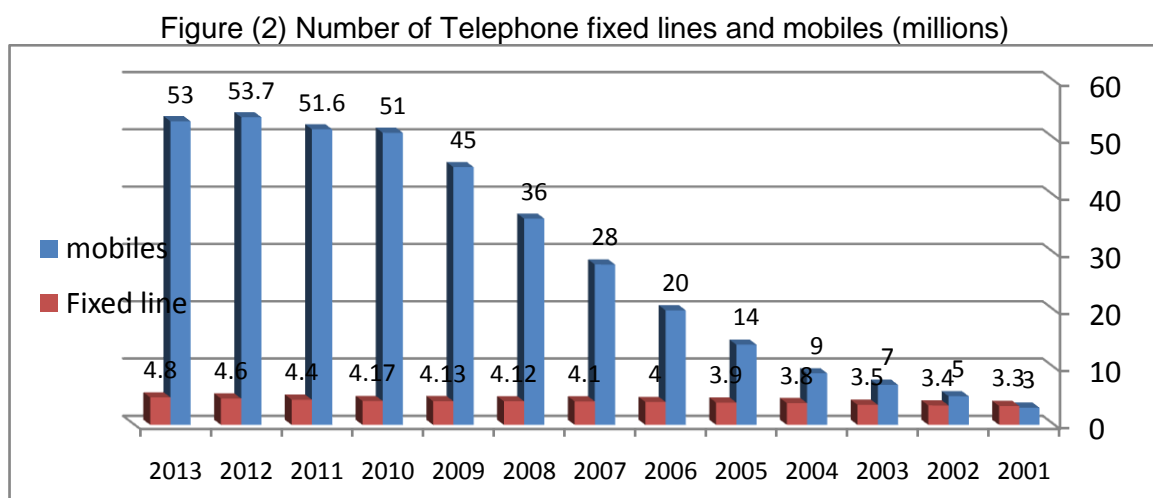


Source: Ministry of Communications and Information Technology, KSA, Annual reports

*Personal computers*

The number of personal computers (PC) index is an important factor in the formation of the infrastructure of E-commerce applications in any society. According the report issued by the International Telecommunication Union (ITU) in 2012, the number of PC per thousand people in the world increased from 27.6 to 42.7 in 2001 and 2012 respectively, while the number of PC per thousand people in Saudi Arabia increased from 341 PC in 2001 to 950 PC per thousand people, with annual growth rate 25% during the study period. (ITU , 2012).

From above discussion, we conclude that the overall business environment of Saudi Arabia gives E-commerce great potential for success, which would position the country as a regional leader. However, to achieve this, Saudi Arabia requires substantial improvements in telecommunication infrastructure with easy and affordable internet access, while shifting towards broadband connectivity. Further, this infrastructure would have to be supported by trained and skilled local IT professionals to meet the demand for human resources in this technology-intensive area. Concurrently, new avenues of imparting the requisite education have to be explored, given the present stress on existing educational institutions.

*Economic growth in Saudi Arabia*

During the period of study there was remarkable economic development in Saudi Arabia, where there was increasing in real GDP due to increasing and the expansion of production capacities simultaneously, and the continuation of the change in the economic structure by increasing the diversification of economic activities and sources of national income, in addition to increasing the contribution of the private sector in economic activities. Tables (3) and (4) show the economic growth rate at macro and scrotal levels that could be summarized as follows:

- Real GDP increased from 636.4 billion riyals in 2001 to almost 1272.44 billion riyals in 2013; therefore, the average growth rate is 5.6% during the study period, which is higher than the growth rate target in both seventh and eighth Saudi development plans (3.5%). This could be due to increasing of government and private sectors productivity as a result of the expansion in using modern technologies, and development administration and management approaches, in addition to rationality of using resources.

- The economic growth associated with increasing per capita income from 30.33 thousand riyals in 2001 to 42.1 thousand riyals in 2013, where its average growth rate was 2.9% during the study period.

Table (3) Real GDP during (2001-2013)

| Years | Real GDP (1999=100) Million riyals | Economic growth rate (%) | Population million | Per capita income (riyal) |
|---|---|---|---|---|
| 2001 | 636417 | 1% | 20.98 | 30334.46 |
| 2002 | 637230 | 0.12% | 21.49 | 29652.4 |
| 2003 | 686037 | 7.6% | 21.77 | 31512.95 |
| 2004 | 749524 | 9.3% | 22.56 | 33223.58 |
| 2005 | 803910 | 7.3% | 23.59 | 34078.42 |
| 2006 | 848742 | 5.6% | 24.12 | 35188.31 |
| 2007 | 899601 | 6% | 24.1 | 37327.84 |
| 2008 | 975412 | 8.4% | 25.79 | 37821.33 |
| 2009 | 993254 | 1.8% | 28.18 | 35246.77 |
| 2010 | 1067097 | 7.4% | 25.73 | 41472.87 |
| 2011 | 1158546 | 8.6% | 28.37 | 40837.01 |
| 2012 | 1225891 | 5.8% | 29.9 | 40999.7 |
| 2013 | 1272446 | 3.8% | 30.23 | 42092.16 |

Source: Ministry of Economy and Planning, Saudi Arabia, annual reports

- Non-oil sectors achieved 5.6% real annual growth. The highest growth rate realized in transport and communications sector, where its growth rate was 6.4% compared with the growth target (4.8%), this could be as result of restructuring of the sector financially and administratively and improvement that has occurred in its productivity.

- Non-oil sectors share in real GDP rose compared with oil sector share during the period under study. Where non-oil sector share rose from 67.6% in 2001 (43.9% from private sector and 23.7% from government sector) to 78.9% in 2013 (59.1% is private sector share and 19.8% is government sector share). The good performance of non-oil sectors is due to rapid growth in the private service sector that has achieved 4.6% real growth during the study period. This is consistent with Saudi Arabia development plans that aim at diversifying income sources of Saudi economy.

Table (4) Economic sectors growth rate and its real GDP shares (2001-2013)

| Years | Oil sector | | Private sector | | Government sector | |
|---|---|---|---|---|---|---|
| | % share of real GDP | Growth rate % | % share of real GDP | Growth rate % | % share of real GDP | Growth rate % |
| 2001 | 32.4 | -3.9 | 43.9 | 3.7 | 23.7 | 3.1 |
| 2002 | 30 | -7.5 | 45.6 | 4.1 | 24.4 | 2.9 |
| 2003 | 32.7 | 17.2 | 44 | 3.9 | 23.3 | 3.1 |
| 2004 | 33.1 | 6.7 | 44.1 | 5.3 | 22.8 | 3.1 |
| 2005 | 33.3 | 6.2 | 44.2 | 5.8 | 22.5 | 4 |
| 2006 | 32.1 | -0.8 | 45.5 | 6.1 | 22.7 | 3.1 |
| 2007 | 30.3 | -3.6 | 47 | 5.5 | 22.7 | 3 |
| 2008 | 27.9 | 4.2 | 49.1 | 4.6 | 23 | 3.7 |
| 2009 | 26.4 | -7.8 | 53.6 | 2.7 | 20 | 5.2 |
| 2010 | 20.9 | 2.4 | 58.2 | 5.7 | 20.9 | 7.1 |
| 2011 | 21.3 | 4.6 | 57.1 | 8.5 | 21.6 | 7 |
| 2012 | 21.2 | 4.8 | 57.8 | 8.1 | 21 | 6.5 |
| 2013 | 21.1 | 5.54 | 59.1 | 7.5 | 19.8 | 6.25 |

Source: Calculated by researcher from Department of Statistics and Information reports, Ministry of Economy and Planning, Saudi Arabia

## METHOD AND MODEL SPECIFICATION

### Data

The study uses times series data for the period (2001-2013) for testing the impact of E-commerce on economic growth in Saudi economy. The data are taken from annual reports of Saudi ministry of economic and planning, UNCTAD reports, World Bank indicators, and annual reports of ITU. The study variables are in real terms (1999=100).

### Model Specification

The study adopts the econometric approach to estimate ratios and relations of trends of E-commerce indicators and real GDP in Saudi economy. The econometric model of the current study depends on the export-led growth hypothesis where the classical productions function that explains the relationship between the output and inputs (labor and capital). In addition we will follow the methodology of economist Sheehey (1990) who added the size of the public and the private sectors to the model, expressing them by government consumption spending and private consumption spending, respectively. Given the importance of terms of trade (TOT) in developing countries, we include this variable to the model as a determinant of economic growth (J.Barro, 1998). Also we add E-commerce indicators. Accordingly we can show the study model as follows:

$$GDPg_t = \alpha_0 + \alpha_1 K/L_t + \alpha_2 ToT_t + \alpha_3 Gov_t + \alpha_4 Priv_t + \alpha_5 ED_t + \alpha_6 ITE_t$$
$$+ \alpha_7 IU_t + \alpha_8 TM_t + \alpha 9 PCs_t + \alpha_{10} CC_t + \mu_t \qquad (1)$$

Where:

| | |
|---|---|
| $GDPg_t$ | Real economic growth rate |
| $K/L_t$ | Capital labor ratio |
| $ToT_t$ | Terms of Trade |
| $Gov_t$ | Scale of government sector |
| $Priv_t$ | Scale of private sector |
| $ED_t$ | Number of business transactions via internet |
| $ITE_t$ | Expenditure on using information and communication technology |
| $IU_t$ | Number of internet users |
| $TM_t$ | Number of telephone fixed lines and mobiles |
| $PCs_t$ | Number of personal computers |
| $CC_t$ | Number of credit card annually |
| $\mu_t$ | Random error |

We apply the differences in order method to remove the general trend, as well as the logarithmic formula in order to obtain the direct estimates of elasticities. Therefore, equation (1) will take the following formula:

$\Delta Ln\ GDP_{gt} = \alpha_0 + \alpha_1 \Delta Ln\ K/L_t + \alpha_2 \Delta Ln\ ToT_t + \alpha_3 \Delta Ln\ Gov_t + \alpha_4 \Delta Ln\ Priv_t + \alpha_5 \Delta Ln\ ED_t + \alpha_6 \Delta Ln\ ITE_t + \alpha_7 \Delta Ln\ IU_t + \alpha_8 \Delta Ln\ TM_t + \alpha_9 \Delta Ln\ PCs_t + \alpha_{10} \Delta Ln\ CC_t + \mu_t$     (2)

Where: $\alpha_1, \alpha_2, \alpha_3$………… are elasticities in the short run

Due to the degrees of freedom (n-k) is low in our econometric model which affects the efficiency and the results of the estimation process, we will excluded three independent variables alternately during the estimating the econometric model. In addition, we use the correlation matrix for the independent variables in order to identify the degree of correlation among them. Durbin Watson Test employed to detect the presence of autocorrelation in the residuals from a regression analysis, in addition to White Test employed to test for residuals constant variance or there is no heteroscedasticity. The study depends on the SPSS statistical software to estimate the econometric model.

**EMPIRICAL RESULTS**

Table (5) shows the econometric model estimation results as follows:

- There is no strong correlation between the independent variables (multicollinearity), which may indicate that, the strength of the study model in the interpretation of the impact of independent variables on the dependent variable.

- DW value is between 1.5and 2.5, which refers to there is no Autocorrelation between the residuals.

- White test value is almost 0.39 which is lower than the critical value; therefore we reject the H1 hypothesis (residuals variance isn't constant) This means there is no heteroscedasticity problem in our model.

- There is a strong correlation between the independent variables and economic growth: where R is almost equals to 0.82.

- F-test shows the significant relationship as a whole; also $R^2$ indicates that 70% of variation in the Real GDP in Saudi economy during the study period is explained by variation in the independent variables in the regression equation. The higher value of $R^2$ indicates high goodness of fit of the model.

Table (5) Econometric model estimation results

|  | Model (1) | Model (2) | Model (3) | Model (4) |
|---|---|---|---|---|
| Constant | 3.1 (1.89) | 2.4 (0.37) | 2.1 (1.59) | 1.8 (2.2)* |
| $K/L_t$ | 1.1 (2.73)* |  |  |  |
| $ToT_t$ |  |  |  | 0.14 (2.4)** |
| $Gov_t$ | 0.41 (2.17)* | 0.67-(2.06-)** |  |  |
| $Priv_t$ |  |  | 0.23 (2.4)* |  |
| $ED_t$ | 0.31 (3.78)* | 0.37 (2.09)* | 0.89 (2.59)* | 0.54 (3.3)* |
| $ITE_t$ | 0.41 (2.17)* | 0.52 (2.07)* | 0.65 (2.02)* | 0.87 (3.21)* |
| $IU_t$ | 0.76 (1.34) | 0.14 (1.81) | 0.64 (2.04)* | 0.7 (2.67)* |
| $TM_t$ | 0.12 (1.45) | 0.45 (1.13) | 0.76 (1.1) | 0.2 (1.78) |
| $PCs_t$ | 0.34 (3.1)* | 0.45 (2.34)* | 0.76 (1.1) | 0.65 (1,48) |
| $CC_t$ |  | 0.58 (1.98)* | 0.56 (1.46) | 0.87 (2.56)* |
| F | 10.2 | 6.23 | 2.02 | 3.38 |
| $R^2$ | 0.6 | 0.719 | 0.56 | 0.715 |
| D.W Test | 1.96 | 2.01 | 2.35 | 1.56 |
| White Test | 0.039 | 0.031 | 0.038 | 0.045 |

*, ** indicates Significance at 5% and 1% respectively. Values in brackets are T-statistics

**Significant some of independent variables with expected sign from economic theory view point as follows:**

-Capital-Labor ratio has positive sign, which means the higher the ratio of K/L the higher rate of economic growth, with 99% degree of confidence.

-The size of the private sector (positive sign) has direct relation with the economic growth. This means that the increasing size of the private sector and its participation in the Saudi economy has helped to increase the economic growth in Saudi Arabia during the study period. This result consistent with the Saudi government economic policy which is encouraging the private sector to increase its contribution to the high value added economic activities.

-TOT has positive sign; this means that the increasing in Saudi exports in one side and decreasing its imports helped to raise Saudi Arabia real GDP during the study period.

-Number of business transactions via the internet has positive sign; this means that when the number of export transactions through the Interne increased it would help to increase Saudi Arabia real GDP, with 95% degree of confidence.

-Expenditure on using information and communication technology has positive sign, which consistent with the modern theories of growth, which indicate that there is a significant positive impact on output when the spending on information and communications technology rises.

-Number of credit cards as a method of payment has positive sign; therefore increasing the number of credit cards is an indicator of increasing purchases and sales via the Internet and then increasing spending and output.

**Significant some of independent variables with unexpected sign from economic theory point of view as follows:**

-The estimation shows that there is a negative relation between the size of public sector and the economic growth during the study period. Despite of this result is not consistent with the economic theory (that indicates the increasing in government spending increasing the output by the multiplier effect), but its consistent with Saudi government fiscal policy to reduce the public spending on some activities that can be performed by the private sector, in addition the privatization policy that started to be applied in some sectors in Saudi Arabia.

**Significant number of independent variables in some models and insignificant in the others as follows:**

-Number of internet users has positive sign and significant in models (3) and (4) while it is insignificant in models (1) and (2)

-Number of telephone fixed lines and mobiles indicator has positive sign but it is insignificant in models (1) and (3), while it is significant in other models

-Number of personal computers has positive sign but it is insignificant in models (3) and (4), while it is significant in other models.

**CONCLUSION**

The current study provides an empirical model that estimates the impact of E-commerce on national economic growth in Saudi Arabia during the period (2001-2013). The choice of this period for analytical purposes was necessitated by the availability of consistent time series data on numerous variables required for estimating the econometric model. The findings reveal that E-commerce promotes the economic growth of Saudi Arabia, where the main E-commerce's indicators such as: the number of business transactions via internet, information and communication technology expenditure, and the number of credit cards have significant and positive impact on economic growth.

The study concludes that E-commerce has the ability to play an instrumental role in helping Saudi economy benefit more from trade. Unlike the requirements necessary to run a business from a physical building, E-commerce does not require storage space, insurance, or infrastructure investment on the part of the retailer. The only prerequisite is a well designed web storefront to reach customers. Additionally, E-commerce allows for higher profit margins as the cost of running a business is markedly less.

Accordingly, the study recommends some polices that can be drawn from the analysis as follows:

- Improve the infrastructure of E-commerce systems, and increase government expenditures, where Saudi government should actively support the construction of E-commerce infrastructure, increase government expenditures in the information technology infrastructure and conduct reasonable guide on the fund's investment.

- Promote and improve the electronic settlement system, and promote consumption increase, where it is strongly suggested to establish uniform standards as soon as possible, encourage the commercial banks and third-party payment services institutions to establish a good working relationship with commercial enterprises and E-commerce businesses and to expand the scope of application of the credit card and other electronic means of payment in order to promote the development of online transactions.

- Establish online security certification (CA) system and promote business investment, where CA can protect equal status of security of the parties in the transaction on the internet. Besides, CA should be served by the authority authorized by the State to promote E-commerce is operated in the safe, orderly environment.

- Promote the building of logistics system and increase business investment, where all kinds of logistics enterprises should actively improve the level of information, optimize the logistics processes and improve logistics and distribution system to improve the delivery efficiency and reduce logistics costs, and providing good support service for E-commerce.

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