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The nexus between domestic investment and economic growth in G7 countries; Does internet matter?

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Abstract

We examine the effect of the Internet on the relationship between domestic investment and economic growth. Data for G7 countries over the period 1991–2018 are used for panel data analysis. Empirical analysis prove that domestic investment affect positively on economic growth, however the internet dont has any effect on economic growth. Also, the effect of domestic investment on economic growth proves to be not affected by the Internet.

Keywords: Domestic Investment, Economic Growth, Internet, G7 Countries, Panel Data Analysis

JEL Classification: O31; O32; O38; O47; O5

1. Introduction

The relationship between the Internet and various macroeconomic variables is well researched, including economic growth (Noh and Yoo 2008; Choi and Yi 2009; Bakari and Tiba 2020), inflation (Yi and Choi 2005), service trade (Freund and Weinhold 2004; Choi 2010), research and development (R&D) expenditure (Choi and Yi 2017), foreign direct investment (Choi 2003), innovation (Bakari 2019; Bakari et al 2020a)

The relationship between domestic investment and economic growth has been explored extensively. The empirical results for the effect of domestic investment on the economic growth are rather mixed. Some are positive (Bakari and Tiba 2019; Mohammed et al 2019; Akalpler and Hove 2019; Sulub et al 2020), others are negative (Bakari 2020; Bakari 2018, Bakari 2017; Umar-Gingo and Demireli 2018) and other are not significant (Appiah 2018; Olanrele 2019; Bakari et al 2020b; Bakari et al 2018; Bakari 2017)

However, how the Internet influences the relationship between domestic investment and economic growth is unexplored. Domestic investment is related to stimulate economic growth and development by its effect on several economic variables (decrease of unemployment, increase of exports ...). According to Bakari (2020), domestic investment is considered one of the most influential elements because of its ability to improve social well-being and strengthen a nation's prosperity..

The Internet is related to the dissemination of knowledge and to the narrowing the geographical distances between/in countries in inducing domestic investment. According to Choi (2003), the Internet is one of main driving forces in expediting the integration of the world economy and thus enhancing the welfare of the human beings.

The internet spillover effect on economic growth can be explained by Romer's (1990) and Coe and Helpman's (1995) endogenous growth model. In this article, we explore whether the interaction terms for domestic investment and the Internet contribute to economic growth.

This article tests the hypothesis that the effect of domestic investment on economic growth is positively influenced by Internet use. Equivalently, we test the hypothesis that the Internet's effect on economic growth will be positively strengthened by an increase in domestic investment. We perform cross-country panel data analysis using World Development Indicator (WDI) data. In Section II, we set up a growth equation. Section III includes the data and the empirical results. Section IV concludes the article.

2. Model and Data

We set up a GDP-growth equation as in [Romer \(1990\)](#) and [Barro \(1997\)](#):

$$Y_{it} = \beta_0 + \beta_1 DK_{it-1} + \beta_2 DNET_{it-1} + \beta_3 DK_{it-1} * DNET_{it-1} + \beta_4 GOV_{it} + \beta_5 INF_{it} + \beta_6 OP_{it} \\ + \beta_7 P_{it} + \beta_8 RD_{it} + w_i + u_t + v_{it}$$

Where w_i is a country effect, u_t is a year effect, and v_{it} is independent and identically distributed error. DX stands for the growth rate of variable X . Y_{it} stands for the GDP growth rate of country i in year t . K_{it} stands for gross fixed capital formation as a percentage of GDP (Domestic investment). NET_{it} stands for the number of internet users per hundred people. GOV_{it} represents the government expenditure as a percentage of GDP. RD_{it} stands researchers in R&D/million people. OP_{it} stands trade/GDP (%). INF_{it} stands inflation, consumer prices (annual %). P_{it} represents annual population growth. The 1-year lagged variables such as DK_{it-1} , $DNET_{it-1}$, and DK_{it-1} , $DNET_{it-1}$ are used to consider lagged effect and to avoid an endogeneity problem.

Data for G7 countries over the period 1991–2018 are used for panel data analysis. All the variables used are from the WDI, World Bank. Summary statistics for the data are registered in Table 1.

The scenic photography of descriptive statistics has been shown by making a boxplot in Figure 1. It shows that mean values are around the median values, which shows that the distribution is approximately normal. There are no extreme or far outliers in the sample. Therefore, our data is appropriate to proceed for panel analysis.

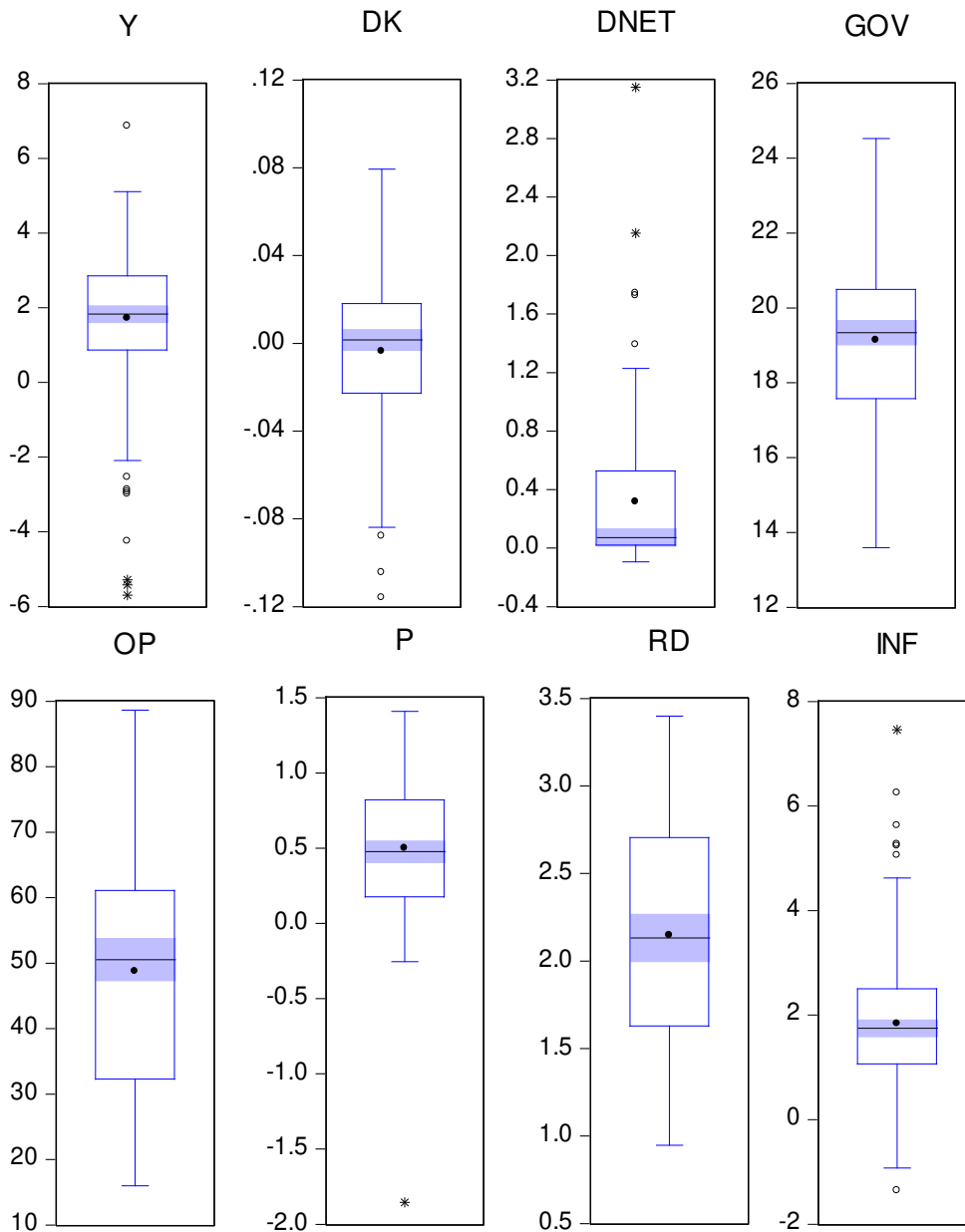


Figure 1. Boxplot of variables

3. Empirical results

Table 2 lists the regression results. We estimated the growth equation (Eq. (1)) by various estimation methods: (a) pooled ordinary least squares (OLS), (b) individual fixed effects, (c) individual random effects, (d) generalized method of moments (GMM) estimation, (e) GMM (Fixed Effect), (f) GMM (Random Effect), (g) Two-Stage Least Squares (2SLS) estimation, (h) 2SLS (Fixed Effect) and (i) 2SLS (Random Effect). The aim of the Hausman test is to define and choose our most suitable model, whether fixed or random. If the probability of the Hausman test is minimum 5%, in this case the fixed-effects model is significant and will be kept. However, if the probability of the Hausman test is greater than 5%, then the random

effect model is significant and will be possessed. In our case, we have the probability that the Hausman test is less than 5% for a value equal to 0.00%. This indicates that the fixed effects model is significant and will be retained. According to the findings of our estimation and based on the output of the Hausman test in Table 2, Pooled OLS Fixed Effect, GLM Fixed Effect and 2SLS Fixed Effect will be chosen to interpret our results. These latter indicate that domestic investment (DK) has positive effect on economic growth (Y) however the use of internet (DNET) has not any effect on economic growth (Y).

The estimated coefficients of the interaction terms of the use of internet and domestic investment (INTER) proved to be positive and not significant through Pooled OLS Fixed Effect, GLM Fixed Effect and 2SLS Fixed Effect. This means that the effect of the use of internet on economic growth does not affect by the domestic investment and the effect of the domestic investment on economic growth does not affect by the use of internet.

4. Conclusion

We hypothesized that the domestic investment strengthens the positive or the negative effect of the use of internet on economic growth in G7 countries. Empirical results indicate that domestic investment has a positive effect on economic growth but the use of the internet does not have any effect on economic growth. Also the interaction terms of the use of internet and domestic investment proved to be positive and not significant, which mean that the effect of the use of internet on economic growth does not affect by the domestic investment and the effect of the domestic investment on economic growth does not affect by the use of internet.

Undoubtedly, the Internet offers positive externalities which enhance economic growth. Moreover, by minimizing transaction costs, time and facilitating communication, productivity improves well, then the way to growth. In this perspective, these economies are invited to direct the use of the Internet towards productive means to reap the benefits of the diffusion of the Internet, in terms of dissemination and creation of spillover, know-how, expertise and information dissemination that leads to facilitate the adoption of innovative technologies in production processes and proactively improve the prosperity of this region as a whole.

Disclosure statement

No potential conflict of interest was reported by the author

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Tables.

Table 1. Statistics

| | Y | DK | DNET | GOV | INF | OP | P | RD |
|-------------------------|-----------|-----------|-------------|------------|------------|-----------|-----------|-----------|
| Mean | 1.717912 | -0.003606 | 0.317553 | 19.14435 | 1.834660 | 48.74383 | 0.500996 | 2.147644 |
| Median | 1.859126 | 0.002055 | 0.079631 | 19.36864 | 1.768577 | 50.70017 | 0.483832 | 2.138040 |
| Maximum | 6.868609 | 0.079442 | 3.150659 | 24.52714 | 7.461783 | 88.67084 | 1.409247 | 3.400220 |
| Minimum | -5.697152 | -0.115852 | -0.092234 | 13.59949 | -1.352837 | 16.01388 | -1.853715 | 0.948430 |
| Std. Dev. | 1.868528 | 0.032142 | 0.463328 | 2.643670 | 1.325765 | 18.31062 | 0.448219 | 0.645429 |
| Skewness | -1.119396 | -0.689914 | 2.303299 | -0.099341 | 0.717644 | 0.028030 | -0.591981 | 0.020413 |
| Kurtosis | 5.864620 | 3.523031 | 10.80678 | 2.520272 | 4.894795 | 2.289990 | 5.409600 | 2.053003 |
| Jarque-Bera | 107.9489 | 17.14772 | 647.0618 | 2.201843 | 46.14410 | 4.142595 | 58.86484 | 5.802618 |
| Probability | 0.000000 | 0.000189 | 0.000000 | 0.332565 | 0.000000 | 0.126022 | 0.000000 | 0.054951 |
| Sum | 336.7107 | -0.681495 | 60.01755 | 3752.292 | 359.5934 | 9553.792 | 98.19524 | 332.8848 |
| Sum Sq. Dev. | 680.8222 | 0.194222 | 40.35841 | 1362.853 | 342.7424 | 65379.33 | 39.17560 | 64.15311 |
| Observations | 196 | 189 | 189 | 196 | 196 | 196 | 196 | 155 |

Table 2 : Panel Estimation Models

| Dependent Variable: Y | | | | | | | | | |
|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|----------------------------|---------------------------|---------------------------|--------------------------------|
| Method | Pooled OLS | Pooled OLS Fixed Effect | Pooled OLS Random Effect | GMM | GMM Fixed Effect | GMM Random Effect | 2SLS | 2SLS Fixed Effect | 2SLS Random Effect |
| C | 3.003574** (1.309766) | 2.269230** (1.061796) | 2.408247** (1.045964) | 3.003574** (1.309766) | 2.269230** (1.061796) | 2.408247** (1.045964) | 3.003574** (1.309766) | 2.269230** (1.061796) | 2.408247** (1.045964) |
| DK | 43.36928*** (4.346661) | 22.16952*** (4.236097) | 30.88356*** (3.883537) | 43.36928*** (4.346661) | 22.16952*** (4.236097) | 30.88356*** (3.883537) | 43.36928*** (4.346661) | 22.16952*** (4.236097) | 30.88356*** (3.883537) |
| DNET | 1.136623*** (0.354498) | -0.347743 (0.489641) | 0.557477 (0.376490) | 1.136623*** (0.354498) | -0.347743 (0.489641) | 0.557477 (0.376490) | 1.136623*** (0.354498) | -0.347743 (0.489641) | 0.557477** (0.376490) |
| INTER | - 35.80648*** (10.39975) | -4.650595 (8.867837) | -18.24409** (8.443539) | - 35.80648*** (10.39975) | -4.650595 (8.867837) | -18.24409** (8.443539) | -35.8068*** (10.39975) | -4.650595 (8.867837) | - 18.24409*** (8.443539) |
| P | 0.989687*** (0.272065) | 0.920244*** (0.224188) | 0.969311*** (0.215810) | 0.989687*** (0.272065) | 0.920244*** (0.224188) | 0.969311*** (0.215810) | 0.989687*** (0.272065) | 0.920244*** (0.224188) | 0.969311*** (0.215810) |
| OP | 0.020667*** (0.007868) | 0.021909*** (0.006159) | 0.021239*** (0.006086) | 0.020667*** (0.007868) | 0.021909*** (0.006159) | 0.021239*** (0.006086) | 0.020667*** (0.007868) | 0.021909*** (0.006159) | 0.021239*** (0.006086) |
| GOV | - 0.187758*** (0.056103) | - 0.135681*** (0.044967) | -0.156512*** (0.044070) | - 0.187758*** (0.056103) | - 0.135681*** (0.044967) | -0.156512*** (0.044070) | -0.18775*** (0.056103) | -0.13568*** (0.044967) | - 0.156512*** (0.044070) |
| INF | 0.021644 (0.128634) | -0.033245 (0.125402) | 0.008601 (0.115385) | 0.021644 (0.128634) | -0.033245 (0.125402) | 0.008601 (0.115385) | 0.021644 (0.128634) | -0.033245 (0.125402) | 0.008601 (0.115385) |
| RD | 0.260837 (0.213917) | 0.294721* (0.167747) | 0.305335* (0.165498) | 0.260837 (0.213917) | 0.294721* (0.167747) | 0.305335* (0.165498) | 0.260837 (0.213917) | 0.294721* (0.167747) | 0.305335* (0.165498) |
| Hausman Test | | | | | | | | | |
| Chi-Sq. Statistic | 32.531219 | | | 32.531219 | | | 32.531219 | | |
| Chi-Sq. d.f. | 8 | | | 8 | | | 8 | | |
| Prob. | 0.0001 | | | 0.0001 | | | 0.0001 | | |
| Observations | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| R² | 0.528343 | 0.771648 | 0.424498 | 0.528343 | 0.771648 | 0.424498 | 0.528343 | 0.771648 | 0.424498 |
| R² adjusted | 0.502499 | 0.716401 | 0.392963 | 0.502499 | 0.716401 | 0.392963 | 0.502499 | 0.716401 | 0.392963 |
| Number of countries | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |

Note: ***, ** and * denote significances at 1% , 5% and 10% levels, respectively;

() denote Std. Error