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The Effect of Inward Foreign Direct Investment and Information and Communication Technology on Economic Growth in Indonesia

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Abstract

Inward foreign direct investment indirectly or directly affect economic growth through various means. For instance, the direct effect might be attributed to production factors, while information and communication technology changes are linked to the indirect effect. This study aimed to examine the impact of direct and indirect inward foreign investment and information and communication technology on Indonesian economic growth. The data was collected from the annual time series from 1994 to 2019. Furthermore, an autoregressive distributed lag model was used to analyze the data and provide accurate conclusions. The results showed that short-term and long-term inward foreign direct investment and information and communication technology significantly affects Indonesian economic growth. In the long term, the direct and indirect effects of inward foreign direct investment are negative and positive, respectively. However, the long-term effect of information and communication technology on economic growth is positive.

Keywords

Inward foreign direct investment, information and communication technology, economic growth, ARDL model.

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Introduction

Background and research objective

Studies show that information and communication technology (ICT) and inward foreign direct investment (IFDI) play an important role in the world economy. Developing countries, such as Indonesia, rely heavily on IFDI as an external source of state finance to improve the performance of their economies. Several developed and developing countries attract IFDI through well-drafted policies that attract these companies to operate in these countries. Host countries benefit from job creation, quality products from increased competitiveness, and the transfer of technology that can be used for future growth (Makiela and Quattara, 2018). On the other hand, ICT also plays a role in sharing, storing, and sending information between companies, investors, and consumers in a country and sometimes between countries worldwide. ICT also helps companies to promote their products and sell them to distributors or consumers. Moreover, distributors and consumers also utilize ICT in finding quality products, buy them, make transactions online, and resell them on online platforms (Farhadi et al., 2012).

Thus far, it is clear that IFDI can directly or indirectly affect economic growth in any nation. The production factors having a direct influence on the economy include capital investment and the growth of workers. In contrast, the indirect influence includes increased worker productivity, new technologies, including ICT and knowledge (Makiela and Quattara, 2018). This concept has led economics and finance scientists to state three contradictory perspectives regarding the effect of IFDI on economic growth. The first perspective suggests that IFDI can directly or indirectly affect economic growth positively. This idea results from the neoclassical and modernization school of thought, which states that IFDI can increase

domestic capital accumulation, employ domestic workers, and enhance technology transfer, thus improving economic growth (Rahman, 2015). The second line of argument is that by worsening the current transaction on the current account and increasing foreign debt, which in turn can reduce economic growth. This perspective is from the dependency theory, which argues that IFDI can negatively affect economic growth due to an industrial monopoly structure (Dutt, 1997; Adams, 2009; Rahman, 2015).

Furthermore, foreign multinational companies often use advanced technology that can only be operated by skilled professional workers that domestic workers rarely meet the required expertise. Many foreign multinational companies investing in the country will accept only a few local workers from the host country, which may not have an expected impact on unemployment in domestic countries. An increase in the unemployment rate hurts economic growth (Moura and Forte, 2013). The third perspective explains that IFDI can positively or negatively affect economic growth depending on several factors, such as the host country's socio-political, economic, and technological conditions (Ilhan Oztuk, 2010; Edwards et al., 2016) or the period of data used (Novita and Nachrowi, 2005; Adam et al., 2015). According to the theory, a positive effect on the economy happens if the host country's economy is development-oriented; on the other hand, the negative effect will occur if the host country has a poor distribution of resources in trade (Dritsaki and Stiakakis, 2014).

ICT will impact the economy when people use it to improve their performance in production. Investors and companies often use ICT to facilitate investment, business and service activities (Kramer et al., 2007; D'souza and Joshi, 2018), reduce production costs and transaction costs (Ketteni et al., 2014). This cost reduction can increase investors' and companies' income, thus increasing national income and economic growth (Lee and Xuan, 2019; Nguen and Pam., 2020; Millia et al., 2020; Rosnawintang et al., 2021).

Several empirical studies have investigated how IFDI and ICT affect economic growth in various countries with different findings. For example, Alfaro et al. (2004) investigated the effect of IFDI on economic growth in 20 OECD countries and 51 non-OECD countries, and Anwar and Sun (2011) based their study in Malaysia with interesting results. These studies concluded that IFDI has a positive effect on economic growth. However, these findings contradicted Alvarado et al. (2017) that investigated the effect of IFDI on the economy of Latin American countries with low income and found that IFDI had a negative impact. Interestingly, the study found that IFDI did not have a significant effect on countries with middle income. Another study by Temiz and Go¨kmen (2013) in Turkey supports the later finding that IFDI does not affect economic growth.

Various researchers with interesting findings have also investigated the role of ICT on economic growth. For example, a study by Amaghionyeodiwe and Annansingh-Jamieson (2017) investigated the effect of ICT on economic growth in Caribbean countries, García (2019) in Mexico, Solomon and Klyton (2020) in African countries, Saidi et al. (2020), and Rosnawintang (2021) in Indonesia, and Arabi and Allah (2017) in Sudan. Amaghionyeodiwe and Annansingh-Jamieson (2017), García (2019), and Arabi and Allah (2017) investigated how internet users and mobile-phone users as ICT proxies affect economic growth, while Solomon and Klyton (2020), Saidi et al. (2020), and Rosnawintang (2021) examined the use of internet users as a proxy for ICT. All these studies found that ICT affects economic growth positively.

Additional studies have also examined the effect of ICT and IFDI on economic growth, including Arvin et al. (2021) that focused on G20 countries using the panel data model. The study found that ICT is affected by IFDI, which in turn affects economic growth in host countries. However, some studies examine how the interaction between ICT and IFDI affects economic growth. An excellent example of such a study is Asongu and Odhiambo (2019), conducted on 25 Sub-Saharan African countries. The study established that IFDI promotes ICT, which then affects economic growth. However, there are limited published studies on the interaction between ICT and IFDI on economic growth, and none has focused on Indonesia as a focal study. Statistically, the interaction effect in question is the indirect effect of IFDI via ICT on economic growth.

This study intends to determine the effect of IFDI, ICT, and their interaction on economic growth in Indonesia. Therefore, it can be form part of the empirical literature in economics and finance, in several areas such as (1) the direct effect of IFDI on economic growth; (2) the effect of the interaction between IFDI and ICT on economic growth, (3) the direct effect of ICT

on economic growth, and (4) the testing of these effects using an autoregressive distributed lag (ARDL) model with interaction variables. The fourth point deviates from the previous studies (Asongu and Odiambo, 2019) that used multiple regression models with interaction variables. The use of the ARDL makes it possible to examine the short and long-term effects.

Literature review

Under this subsection, the study reviews some relevant previous empirical studies to borrow their understanding. The review is divided into three groups, 1) studies focusing on the effect of IFDI on economic growth, 2) studies examining the effect of ICT on economic growth, and 3) studies explaining the interaction effect of IFDI and ICT on economic growth.

Different empirical studies conclude that IFDI has a positive or negative impact on economic growth. For instance, Aurangzeb and Stengos (2014) examined the role of IFDI on economic growth in several countries across the world using a semi-parametric smooth coefficient approach as the test tool. They found that an increase in IFDI promotes economic growth. Abdouli and Hammami (2017) conducted a study to investigate the relationship between IFDI and economic growth in MENA countries using the PVAR test of annual time series with data from 1990 to 2012. The study established that changes in IFDI cause changes in economic growth.

Additionally, Rahman (2015) conducted a study using Bangladesh's annual data from 1999 to 2013 to evaluate the effect of IFDI on economic growth in that country. Rahman employed a multiple regression model analysis, concluding that IFDI had a positive effect on economic growth. Another study by Adams (2009) used the dynamic panel model in examining the effect of IFDI on economic growth in Sub-Saharan African countries. This study collected data from 1990 to 2003, showing that IFDI positively affects economic growth. Herzer et al. (2008) also examined the effect of freign direct investment on economic growth in 28 developing countries using the ARDL panel model to analyze the data. However, the finding of this research has divided the effects into two categories, long and short-term effect of foreign direct investment on economic growth. In the long term, foreign direct investment is found to have positive effects on some countries, while the rest is negative. Research by Susilo (2018) examined the effect of IFDI on economic growth in the United States, dividing the economy into several sectors, such as manufacturing, real estate, wholesale trade, retail trade, finance, information, banking, insurance, and services. The finding of the results based on the multiple regression model shows that almost all sectors (manufacturing, retail, wholesale trade, real estate trade, and rentals) negatively affect economic growth.

Habibi and Zabardast (2020) focused on the effect of ICT (proxy by internet and mobile phone users) on the economy using the fixed effect panel model, with the Middle East and OECD countries as the focal of study using annual data from 2000 to 2017. The finding of this study suggested that. ICT positively affects economic growth. Tripathy and Inani (2020) also investigated the ICT's effect on economic growth in South Asian Association for Regional Cooperation (SAARC) countries, including Pakistan, India, Bangladesh, and Sri Lanka. This study used a panel data model analyzing annual data from 1990 to 2014 and established that ICT proxied by internet and mobile phone users had a positive effect on the economic growth in the four countries. The study also concluded that ICT had a greater impact on India's economy than its counterparts. Another study that showed ICT's positive relationship with economic growth is Makun and Devi (2019), which focused on Fiji Islands country using the autoregressive distributed lag (ARDL) model with data from 1990 to 2016. Makun and Devi demonstrated that increased use of mobile cellular and cell phones for the internet promoted economic growth.

Dimelis and Papaioannou (2010) used annual data from 1993 to 2001 from 42 developing and developed countries and investigated the effect of IFDI and ICT on economic growth. The study's panel data model test found that IFDI positively affects economic growth in developed countries but does not affect production growth in developing countries. However, the study also established that ICT affects economic growth in all developed and developing countries. On the other hand, Ketteni et al. (2014) surveyed the effect of ICT, IFDI, and their interaction on economic growth in 15 OECD countries using annual data from 1980-2004. The test analysis used the non-parametric estimation method and concluded that IFDI, ICT, and interactions significantly impacted economic growth. Dhrifi (2015) sought to determine how IFDI and ICT on economic growth in 83 developed and developing countries by examining annual data from 1990 to 2012. The study used the number

of computer users as a proxy for ICT. A simultaneous equation model to test this effect showed that IFDI and ICT significantly affect economic growth. Some studies also ascertain that IFDI has a significant positive effect on economic growth indirectly through ICT.

Furthermore, Latif et al. (2018) explored IFDI and ICT's impact on economic growth in BRICS countries using data from 2000 to 2014. The ICT variable was proxied by the ICT index and the panel model test, concluding that IFDI and ICT affect economic growth. A U.S.-based study by Adedoyin et al. (2020) looked into the effect of IFDI, ICT, and their interaction on GDP in the country using a multiple regression model with the interaction variable and annual data from 1981 to 2017 showed that IFDI negatively affects GDP growth. It also established that ICT and interaction positively affect the GDP of the country. According to the study, the negative effect is related to the education level and the institution quality of IFDI in the United States.

Materials and methods

Data

This study uses three annual time series data types: IFDI, ICT index, and GDP per capita from 1994 to 2019. This study uses ICT index data constructed from data in internet users, mobile phone users and fixed telephone users using the weighted index method (see Latif et al.,2018 and Nair et al., 2020). In the analysis model, the variables that accommodate the natural logarithm of IFDI, ICT index, and GDP per capita data are expressed by FDI, ITI, and GDP, respectively, where GDP is a proxy for economic growth. Moreover, the interaction variable between FDI and ITI is mathematically expressed by FIT, where FIT = FDI x ITI. The units of FDI are USD, ITI is expressed as a percentage (%), and GDP is the USD. ICT (internet users, mobile phone users and fixed telephone users) and GDP per capita data are obtained from the World Bank website, while IFDI data is obtained from the Indonesian Central Statistics Agency.

Methods

The study's methodology examines the long and short-term effects of IFDI, ICT, and their interactions on economic growth. The regression model is used to test the long-term cointegration between variables used with the specification of the equation.

$$GDP_t = C + \theta FDI_t + \varphi ITI_t + \delta FIT_t + \varepsilon_t \qquad (1)$$

where C, θ, φ, and δ are the long-term multiplier parameters of the regression equation (1) which are believed to be stable between 1994 and 2019. The classical assumptions of error or residual is fulfilled by ε_t in the equation (1), namely: homoscedastic, independent and normally distributed. FIT in equation (1) is the interaction variable between FDI and ITI, thus $FIT_t = FDI_t \times ITI_t$, t = 1994, 1995, …, 2019.

Equation (1) determines the modification result of the autoregressive distributed lag (ARDL) model. In the long run, the FDI, ITI, FIT, and GDP variables are considered (stable) (Heij et al., 2004). The ARDL model formulation with a time lag length of p, q, r, s abbreviated ARDL(p, q, r, s) is as follows (Pesaran et al., 1999; Heij et al., 2004).

$$GDP_t = C_0 + \sum_{i=1}^{p} \alpha_i GDP_{(t-i)} + \sum_{j=0}^{q} \theta_j FDI_{(t-j)} + \\ + \sum_{k=0}^{r} \varphi_k ITI_{(t-k)} + \sum_{l=0}^{s} \delta_l FIT_{(t-l)} + \varepsilon_{1t} \qquad (2)$$

where C_0, $\alpha_i (i = 1, 2, I, p)$, $\theta_j (j = 0, 1, \ldots, q)$, $\varphi_k (k = 0, 1, \ldots, r)$, and $\delta_l (l = 0, 1, \ldots, s)$. The equation (2) also has long-term parameters, meaning that the ARDL model in (2) is also regarded as the long-term model, representing the effect of IFDI, ICT, and their interaction on economic growth in the long term (Ozturk and Acaravci, 2010). The relationship between the parameters in equations (1) and (2) is $C = \frac{C_0}{1-\sum_{i=1}^{p} \alpha_i}$, $\theta = \frac{\sum_{j=0}^{q} \theta_j}{1-\sum_{i=1}^{p} \alpha_i}$, $\varphi = \frac{\sum_{k=0}^{r} \varphi_k}{1-\sum_{i=1}^{p} \alpha_i}$, and $\delta = \frac{\sum_{l=0}^{s} \delta_l}{1-\sum_{i=1}^{p} \alpha_i}$.

The residual ε_{1t} is identically distributed which is independent and homoscedastic, while the parameters α_i $(i = 1, 2, I, p)$, θ_j $(j = 0, 1, \ldots, q)$, φ_k $(k = 0, 1, \ldots, r)$, and δ_l $(l = 0, 1, \ldots, s)$ are stable in the long term.

This study conducted four test steps to establish the relationship between IFDI, ICT, interaction, and economic growth. These four steps include 1) testing the unit root of the variables involved in the model (1) or (2); 2) testing the cointegration between FDI, ITI, FIT, and GDP variables; 3) estimating the model parameters, and 4) testing the model assumptions for residuals and parameter stability. The study employed the Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) and the Phillip-Perron (PP) test (Phillips

and Perron, 1988) to which are unit root tests in the first step. The hypothesis is formulated as H_0: time series has a unit root (not stationary) versus H_1: time series does not have a unit root (stationary). In determining whether the time series is stationary, the study used a test criterion for testing hypothesis where H_0 is rejected (H_1 is accepted) if the p-value of the test statistic is less than the critical value at a significance level of 1%, 5%, or 10%.

The second step explored the cointegration between FDI, ITI, FIT, and GDP using the theARDL bound cointegration test (Pesaran et al., 2001). The ARDL model does not allow variables that are stationary in the second difference or process I(2). This step is valuable in ensuring that none of the variables in the model in the process I(2) are non-stationary. Another requirement is that variables on the ARDL model regressors can be stationary at the first difference, level, or both. Therefore, the expected results can be represented as I(0), I(1), or both; however, the dependent variable can be represented as I(0) or I(1) (Sam et al., 2019). The ARDL bound cointegration test model formula is as follows:

$$D(GDP_t) = C_0 + \sum_{i=1}^{p-1} \alpha_i D(GDP_{(t-i)}) + \\ + \sum_{j=0}^{q-1} \theta_j D(FDI_{(t-j)}) + \sum_{k=0}^{r-1} \varphi_k D(ITI_{(t-k)}) + \\ + \sum_{l=0}^{s-1} \delta_l D(FIT_{(t-l)}) + \beta_1 GDP_{t-1} + \beta_2 FDI_{t-1} + \\ + \beta_3 ITI_{t-1} + \beta_4 FIT_{t-1} + \varepsilon_{2t} \quad (3)$$

where β_i (i = 1, 2, 3, 4) is the parameters of the regression equation (3) and ε_{2t} is the residual. The ARDL bound cointegration test hypothesis formulation between FDI, ITI, FIT and GDP is H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ signifying that all-time series are not cointegrated. On the other hand, the alternative hypothesis is H_1: is $\beta_j \neq 0, j = 1, 2, 3, 4$ signifying that all-time series are cointegrated. If the F-statistic value is greater than the critical value of the upper bound I(1) at a significance level of 1%, 5%, or 10% , then the H_0 is rejected and (H_1 is accepted).

The third step of the study examines the short-term effect of IFDI, ICT, and their interaction on economic growth using the error correction model (ECM-ARDL). The formula for the ECM-ARDL(p-1, q-1, r-1, s-1) model is as follows (Heij et al., 2004).

$$D(GDP_t) = \theta_0 D(FDI_t) + \varphi_0 D(ITI_t) + \\ + \delta_0 D(FIT_t) + \pi EC_{t-1} + \sum_{i=1}^{p-1} \alpha_i^* D(GDP_{(t-i)}) + \\ + \sum_{j=1}^{q-1} \theta_j^* D(FDI_{(t-j)}) + \sum_{k=1}^{r-1} \varphi_k^* D(ITI_{(t-k)}) + \\ + \sum_{l=1}^{s-1} \delta_l^* D(FIT_{(t-l)}) + \varepsilon_{2t} \quad (4)$$

where in equation (4), α_i^* (i = 1, 2,…, p - 1), θ_j^* (j = 1, 2,…, q - 1), φ_j^* (k = 1, 2,… , r - 1) and δ_k^* (k = 1, 2,…, s - 1) are short-term parameters.

The fourth step of the analysis tests the stability of the classical assumptions of residuals and model parameters. The Breusch-Pagan-Godfrey (BPG), Breusch-Godfrey Serial Correlation LM (BGSCLM), and Jarque Bera (JB) tests were also used in testing homoscedasticity, independence, and normality of the parameters. However, testing the stability of the model parameters required the use of the CUSUM and CUSUM Square tests (Brown et al., 1975).

Results and discussion

Results

Table 1 shows the statistical values of the stationarity testing of all variables. The results of ADF and PP tests indicate that FDI and FIT are stationary in the second difference, while ITI and GDP are stationary at the level and first difference.

Variable	ADF test statistics		PP test statistics	
	Intercept	Intercept and trend	Intercept	Intercept and trend
FDI	-1.2572	-2.7615	-1.1331	-2.7118
D(FDI)	-5.6727*	-5.5613*	-6.1198*	-6.0643*
ITI	-3.6916**	1.2725	-2.9567***	1.0594
D(ITI)	-1.0408	-3.6468**	-2.5137	-3.6237**
FIT	-0.8372	-2.159	-0.7767	-2.1622
D(FIT)	-5.2916*	-5.1663*	-5.3117*	-5.1803*
GDP	1.3584	-24.6660*	0.6207	-1.5709
D(GDP)	-2.7097***	-4.1125**	-3.7397**	-4.1525**

Note: *, **. *** significant 1%, 5%, 10%
Source: Own proccsing

Table 1: Stationary test results.

After testing, the next step is to test the cointegration between FDI, ITI, FIT, and GDP with the ARDL bound test follows the testing for stationarity of all variables used in the research. Before the cointegration test, a determination of the length of the lag time of the ARDL model is first conducted based on the minimum statistic value of the AIC (Akaike Information Criteria), thus obtaining the time lag lengths as p = 1, q = 3 and r = s = 4. This means that the ARDL(1,3,4,4) bound model is used to test cointegration. According to the calculation from the data, the F-test statistic value is 177.8733, which is compared with the critical statistic of upper bound I(1) at a significance level of 1% of 4.66. Since the critical statistic is much smaller than the test statistic, it is concluded that there is long-term cointegration between FDI, ITI, FIT, and GDP.

Table 2 below contains statistic values that can help in estimating the long and short-term parameters and coefficients. The table shows that the long-term coefficients of FDI, ITI, and FIT are significant at the significance level of 7%, 1%, and 5%, respectively, meaning they affect economic growth in the long term. The result also shows that IFDI harms the economy, meaning that economic growth will decrease if it increases. However, the indirect effect of IFDI through ICT on economic growth is positive, showing that in the long term, an increase in IFDI contributes to an increase in ICT, which in turn increases economic growth. On ICT, the results show a positive long-term effect on economic growth-. Increase in ICT promotes increased economic growth.

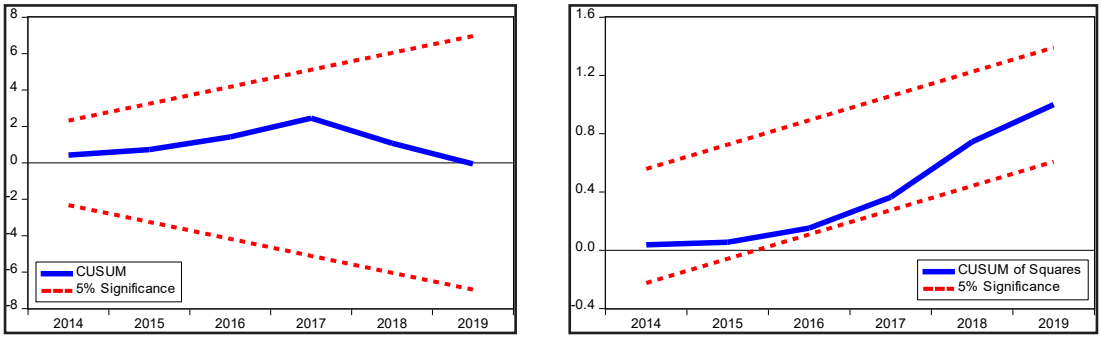
Table 2 in panel B also shows the estimation results for the short-term parameters of the ECM-ARDL model. All the coefficients of the variables in the ECM-ARDL(0,2,3,3) model are significant, except for D(ITI (-1)) and D(ITI(-3)). This table highlights that, in the short term, there are direct and indirect effects of IFDI and ICT on economic growth.

Table 2 also shows the calculation results of Chi-square statistic probability values from the autocorrelation (BGSCLM), homoscedasticity (BPG), and normality (JB) tests on the residuals. The ARDL(1,3,4,4) model has independent, homoscedastic, and normally distributed residuals. Furthermore, the stability of the ARDL(1,3,4,4) model parameters is also tested. The CUSUM and CUSUM Square tests show that the model parameters are stable. The stability test results are shown in Figure 1.

Intercept and variable independent	Coefficient	t-Statistics	P-value
A. Long-run coefficient, dependent variable: GDP			
FDI	-0.1667	-2.2821	0.0626
ITI	0.1141	11.234	0.0000
FIT	0.0250	3.4872	0.0130
C	7.7294	235.4484	0.0000
B. Short-run coefficient, Dependent variable: D(GDP)			
D(FDI)	0.0739	8.4423	0.0002
D(FDI(-1))	0.1562	10.4338	0.0000
D(FDI(-2))	0.1324	8.2427	0.0002
D(ITI)	0.0271	4.1334	0.0061
D(ITI(-1))	-0.0011	-0.2357	0.8215
D(ITI(-2))	0.0260	5.9585	0.0010
D(ITI(-3))	0.0040	1.3719	0.2192
D(FIT)	-0.0080	-6.8476	0.0005
D(FIT(-1))	-0.0199	-10.5522	0.0000
D(FIT(-2))	-0.0166	-8.3887	0.0002
D(FIT(-3))	0.0009	2.3080	0.0604
EC(-1)	-0.5430	-38.5004	0.0000

Note: The p-values of the test statistics based on the Chi-Square statistics of BPG, BGSCLM, and JB are 0.8130, 0.7651, and 0.377583, respectively.
Source: Own processing

Table 2: Estimation of long and short-term coefficients from ARDL(1,3,4,4) and ECM-ARDL(0,2,3,3) models.



Source: Own processing.

Figure 1: CUSUM and CUSUM Square tests.

Discussion

IFDI has direct and indirect effects on economic growth in the long term. Several studies, such as Susilo (2018), Latif et al. (2018), Alafarado et al. (2017), Herzer et al. (2008), and Adedoyin et al. (2020), show that IFDI has a negative direct effect on economic growth. This is attributed to various factors, including the emergence of industrial monopolies practiced by multinational companies (Dutt, 1997; Adams, 2009; Rahman, 2015); the level of education and quality of IFDI inflow institutions (Adedoyin et al., 2020), and the low absorption of local workers by multinational companies in the host country (Moura and Forte, 2013); However, other studies, such as Dimelis and Papaioannou (2010), Aurangzeb and Stengos (2014), Abdouli and Hammami (2016), Rahman (2015), and Adams (2009) arrived at a different conclusion. This difference could be due to the differences in the characteristics of the countries used as study locations (Ozturk, 2010; Edwards et al., 2016) or the period of data used (Novita and Nachrowi, 2005; Adam et al., 2015). This is in line with Ketteni et al.(2014), Dhrifi (2015), and Adedoyin et al. (2020), which showed that this aspect positively impacting the economy. Some studies also show that IFDI can affect economic growth in the short term, as supported by Herzer et al. (2008).

ICT positively affects economic growth in the long term. Adopting technology in economic activity may increase economic growth. This is in line with Makun and Devi (2019), Habibi and Zabardast (2020), and Tripathy and Inani (2020). The proposed policy implies that IFDI is an integral part of the economy and should be promoted for economic growth.

Various stakeholder policies, including restricting industrial monopolies for multinational companies and increasing the absorption of local workers to work in multinational companies, should prioritize making IFDI a driving factor for economic growth. The increase in worker absorption can reduce the unemployment rate, promoting economic growth, especially in Indonesia as one of the IFDI recipient countries. Although the empirical results show that ICT drives economic growth, there is room to grow in many developing countries as the world becomes digitalized. The results of this development will significantly contribute to the advancement of ICT in all fields, especially in economics and finance. The impact of ICT development relates to its use in the economy, such as minimizing industrial costs, which can increase national income and economic growth.

Conclusion

IFDI and ICT affect the world economy, including Indonesia. Studies on IFDI on economic growth show that it can directly or indirectly affect the economy. The direct effect relates to the use of capital and workers, while the indirect effect is attributed to ICT advancement. Specifically, ICT improves economic performance because companies rely on it to promote their e-commerce. Consumers also utilize it to determine quality products, buy them, and make online transactions. This study examined the direct and indirect effects of IFDI and ICT on economic growth using annual time series data from 1994 to 2019. IFDI, ICT index, and GDP per capita data were used as proxies for economic growth while data was analyzed through ARDL model.

The test using the ARDL model found long-term cointegration between IFDI, ICT, and their interactions with economic growth. The estimation results of ARDL(1,3,4,4) and ECM-ARDL(0,2,3,3) model parameters showed that the IFDI and ICT have long and short-term effects on the growth economy.

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