The Nexus of Inducing Development: Measure Path Discourses in Indonesia's Dynamic Landscape

Ivan Sudibyo

Faculty of Economics and Business, Universitas Indonesia

Corresponding Author: ivansudibyo14@gmail.com

Abstract

This research applies the ARDL model to delve into the factors that influence Total Factor Productivity (TFP), drawing on Romer's theory of endogenous growth. It underscores the importance of human capital, innovation, and research in fostering sustainable economic growth, with a focus on principal variables such as human capital development (measured by HDI), innovation and competitiveness (driven by FDI inflows), R&D expenditure, and employment dynamics. The study reveals that FDI, R&D spending, and employment significantly impact TFP growth, with FDI inflows identified as a push driver of TFP growth by enhancing innovation and competitiveness. It also highlights the role of R&D expenditure in boosting TFP, emphasizing the need for a supportive environment for research and innovation. The labor force is also found to contribute significantly to TFP. The research further explores the interaction between the labor force and R&D, suggesting the need for policies that support both workforce development and innovation for sustained prosperity. The study also incorporates the concept of employment elasticity with respect to growth as a measure of inclusive development. It concludes by advising stakeholders to prioritize the promotion of FDI inflows, entice R&D spending, and treatise labor force issues to enhance TFP growth and ensure long-term economic prosperity. This underscores the importance of stakeholders' cooperation in leveraging investments for long-term economic prosperity.

Keywords: sustainable development, measure path, r&d investment, Indonesia

1. Research Background

Romer's 1994 research on endogenous growth theory posits that the engine of economic growth is fuelled by internal elements such as human resource investment, innovation, and knowledge, all of which are vital for economic development. The research underscores the beneficial ripple effects of technology and expertise on economic evolution and growth.

In the aftermath of Covid-19, Romer's theory, which prioritizes technological advancement and knowledge accumulation, gains more significance. The theory proposes that the boundless capacity of knowledge can propel economic recovery even in tough times. This highlights the necessity of investments in education, skills enhancement, and innovation. Moreover, the pandemic has hastened the transition towards sectors that are heavily dependent on innovative concepts, suggesting that cultivating an environment that promotes the growth and application of knowledge is essential for both economic revival and labour market durability. The two primary catalysts for long-term productivity growth, as forecasted by endogenous growth theory (Romer (1990), Grossman and Helpman (1991), Uzawa (1965), and Lucas (1988) among others), are research and development (R&D) and human capital.

The study by Ssenyonga,M. (2021) found demonstrated a gap between long-term and covid economic performance, attributable largely to the impact of COVID-19 pandemic on the economy and society. A drastic declined in aggregate demand due to contraction in household and corporate expenditure, investment, and exports sparked a surge in open unemployment and underemployment. While swift and wide-ranging government response helped to attenuate the impact of the crisis on the economy and vulnerable sections of society, COVID-19 pandemic impact compounded existing fundamental problems facing the Indonesian economy including de-industrialization, wide urban–rural, East–West, inter-regional digital divide; unemployment and underemployment; weak human resource development; low participation in global value chains.

In the framework of the current landscape post-COVID recovery, marked by global uncertainties, demographic conditions, and evolving labor market conditions, there is a critical need to proactively engage in research aimed at fostering sustainable growth. This necessitates a deep understanding of the shifting demands of the workforce, adaptation to emerging market trends, and the implementation of innovative approaches to ensure long-term economic resilience and sustainable progress. The goal is to develop a robust and sustainable growth framework capable of withstanding future adversities and thriving in a world reshaped by the pandemic.

Amidst the complexities of the post-COVID era, it is essential to anticipate and respond to the dynamic challenges brought about by global uncertainties and demographic conditions. By recognizing the evolving needs of the workforce and adjusting strategies to align with changing market dynamics, organizations can position themselves for enduring adjust in the face of uncertainty. Embracing innovation and flexibility in operations will be key to fostering resilience and driving sustainable growth in the aftermath of the pandemic.

The overarching objective is to craft a resilient and adaptable growth model that can navigate the uncertainties of a post-pandemic world while maintaining a focus on environmental sustainability and advancement. By investing in research that anticipates future trends, organizations can lay the competitive groundwork for sustainable development and continued prosperity in an ever-evolving economic landscape. This forward-thinking approach aims to empower businesses to not only weather current challenges but also thrive in the transformative aftermath of the global crisis.

2. Literature review

The 2024 study by Imran Hussain Shah and colleagues investigates the impact of research and development (R&D) activities on employment across 33 industries in Japan. The study finds that innovation leads to employment growth, both overall and within major industry groups. The benefits of technological progress are particularly evident in the manufacturing sector. The study also uncovers varying patterns of employment growth determinants based on the routine intensity level of industries, aligning with the compensation theory that links innovation to job creation. These findings can guide policymakers in formulating economic strategies that promote technological development in Japan and other countries with similar workforce and macroeconomic profiles. The research uses a panel dataset from 2002 to 2017 of Japanese industry sectors to explore the relationship between R&D spending and employment. The key takeaway from the paper is that innovation significantly contributes to job creation, supporting the compensation theory that the positive impacts of innovation surpass the potential job losses due to technological progress.

In 2022, a study by Choi revealed that Korea's shift towards a knowledge-based economic model resulted in significant changes in the job market. The study found an increase in the proportion of service jobs relative to manufacturing jobs, and industries requiring specialized knowledge and skills saw growth. Seoul emerged as a focal point for job creation, becoming a centre for economic activity and employment opportunities. These shifts in job creation patterns underscore the need to support and foster the development of knowledge-intensive industries, given their critical role in job creation and economic growth. Policymakers should prioritize the growth of knowledge-intensive tradable service industries, given their importance in job creation. This can be achieved through targeted policies such as incentives for investment, promoting innovation and research and development, and enhancing workforce skills and education in these sectors. Such measures can help maintain job creation and economic growth during the transition to a knowledge economy.

Consistent with Choi's (2022) observations, research conducted by Inekwe, J. N. in 2014 and Ulku, H. in 2004 also highlighted the positive impact of R&D expenditure on the economic growth of developing countries. Specifically, Ulku, H. (2004) found a positive correlation between per capita GDP and the level of innovation in both OECD and non-OECD countries. However, the impact of R&D on innovation was found to be significant only in OECD countries with large markets. These findings support endogenous growth theories, but they do not provide evidence for constant returns to innovation via R&D, suggesting that innovation does not continuously drive economic growth. Despite this, these results do not entirely dismiss R&D-based growth models, considering that the full scope of innovation and R&D activities is not captured by either patent or R&D data.

The 2012 study by Bogliacino, F., and Vivarelli explored the effects of R&D on employment. Their research suggests that spending on R&D has a positive impact on job creation in European nations, reinforcing the idea that R&D can boost employment growth and should be considered in policy-making aimed at enhancing job opportunities.

The 2015 research by Gumus et al. carries out an in-depth empirical analysis of the relationship between research and development (R&D) expenditure and economic growth, investigating if this relationship differs based on the level of development. The research utilizes data from 52 countries over a period from 1996 to 2010 and employs a dynamic panel data model. The results indicate that R&D spending has a significant and positive effect on economic growth for all countries over a long duration, which is consistent with existing literature. For developing countries, the impact starts off as weak but strengthens over time. This research adds new empirical evidence to the field. Their empirical findings suggest that more resources should be

devoted to R&D activities in developing countries to accelerate growth and improve economic performance.

Numerous empirical studies have been conducted to highlight the correlation between human capital development and economic performance. One such study was conducted by Zerihun in 2014, which examined the relationship between human capital development and economic growth in Ethiopia. The study discovered a significant positive correlation between human capital development and economic growth. It also demonstrated that long-term investment in human capital indicators, such as education and health, can stimulate economic growth. The study concluded that as the population increases, the government should strive to create an environment that promotes better education and healthcare, which in turn would boost economic growth.

In a separate study, Gebrehiwot (2015) analysed the influence of human capital on economic growth in Ethiopia over the period from 1975 to 2011. The research methodology used in this study was the autoregressive distributed lag (ARDL) approach to co-integration. The estimated long-run model suggests that human capital, in the form of health, has a substantial positive impact on the rise of real GDP per capita, followed by the education of human capital. The findings of this research align with the endogenous growth theories. In the short term, the coefficient of the error correction term (ECT) is -0.7366, indicating an annual adjustment of approximately 73.66% towards long-term equilibrium. The implications of this study are that significant improvements in economic performance can be achieved when the ratio of public expenditure on health (PEH) to GDP increases and when there is an improvement in secondary school enrolments. In a more recent study, Hakooma and Seshamani (2017) investigated the influence of human capital on economic growth in Zambia in both the short and long term, utilizing Johansen's co-integration test and the error correction model (ECM). The study, which used annual data from 1970 to 2013, found a long-term relationship between economic growth and human capital. The estimated long-term model shows that human capital, primarily in the form of health, is the main driver of real GDP per capita growth, followed by education. These findings align with endogenous growth theories, which posit those enhancements in human capital, such as skilled and healthy workers, boost productivity.

In 2019, Odonkor conducted a study to assess the influence of human capital on Ghana's economic growth. The research utilized the ordinary least squares (OLS) regression method to evaluate the models and analysed data from 1970 to 2010. Based on prior economic expectations and the results of the regression analysis, it was found that there is a positive correlation between human capital and economic growth in Ghana. The study concluded that enhancements in human capital contribute to economic growth.

In their 2021 study, Wahyudi, S.T., and colleagues concluded that for a swift economic recovery post-Covid-19, it is crucial for policymakers to focus on the agricultural and industrial sectors due to the significant value they add. They suggested specific strategies for the rural sector, such as investments that can enhance both profit and social returns, thereby fostering economic growth. For the industrial sector, they recommended the establishment of a favourable business environment and legal certainty, the adoption of cutting-edge technology to boost quality, efficiency, and productivity, and the provision of fiscal incentives. They also proposed the implementation of mentorship and incubation programs to develop processed products from both sectors, thereby increasing their value-added. The rationale behind these recommendations is that the value-added from these two sectors can act as a catalyst for economic growth, a claim supported by the findings of their study.

Edifice on the findings of Wahyudi, S.T., et al. (2021), it's worth examining the broader socio-economic landscape of Indonesia. This context is crucial in understanding the potential impact of the proposed policies. From 1976 to 2012, Indonesia demonstrated significant progress in reducing poverty. The drivers behind this reduction were sustained economic growth and macroeconomic stability. Over the past thirty years, Indonesia has seen a rapid improvement in its socio-economic conditions. During this time, Indonesia's per-capita GDP tripled. According to the World Bank, Indonesia's per-capita GDP (PPP, 2005 US$) soared from $1,323 in 1983 to $4,271 in 2012. The average share of industrial output in GDP has increased almost 9% during the 30-year period. This substantial increase in income and the transformation of Indonesian economy have been accompanied by improvements in social indicators such as the massive decrease in the absolute poverty incidence from 28.6% (1980) to 11.7% (2012) in headcount ratios; measured by national poverty line. However, the rate of poverty reduction has started to slow down with inequality continuing to rise significantly. The Gini coefficient measured by the expenditure (consumption) substantially increased roughly from 0.33 in 2002 to 0.41 in 2012 (Dartanto, 2013). Banerjee and Duflo (2005), along with the World Bank (2005), have pointed out that growing inequality diminishes the effectiveness of poverty reduction in relation to growth and adversely affects an economy's growth prospects. Increased inequality can foster resistance and hinder a government's capacity to implement crucial reforms for economic growth (Coudouel, Dani, and Paternostro, 2006). This paper also explores the measurement of inclusivity as per Dartanto (2013) by assessing the elasticity of labor force to growth.

Theoretical framework

The theoretical underpinning of this model will be based on the endogenous growth model. The endogenous growth model posits that advancements in technology and human capital are key drivers of output enhancement. To accurately gauge the effect of human capital development on Indonesia's national output, this study will employ the augmented Solow human-capital-growth model, adapted from Ghosh, T., et. al., (2021), Orji, et.al, (2020) and Kripfganz, S., et.al, (2023). This is because Solow's original model did not specifically include human capital. The core assumption of this approach is that by expanding the workforce and improving its quality through better education and healthcare measured in HDI, output can be increased. Therefore, the augmented Solow model is defined as follows:

$$Y = A^{\sigma} K^{\alpha} (hL_F)^{1-\propto},\ 0 <\propto< 1; \quad (1)$$

When transformed into a log-linear form, it becomes,

$$\text{Log } Y = \alpha 0 + \alpha \log K + \beta \log L + v \quad (2)$$

We adjusted the model to include additional variables, specifically HDI and employment. These two variables are integrated to represent human capital development. Furthermore, we incorporated the variables FDI and R&D, following the approach of Ghosh, T., et. al., (2021).

The new expanded model is thus stated as follows:

$$\text{Log } Y = \alpha 0 + \alpha 1 \log K + \alpha 2 \log RD + \beta \log L + \alpha 3 \log HDI + v \quad (3)$$

The empirical model for this study can be expressed functionally as:

$$D(Y) = f(D(L), D(HDI), D(RD), D(FDI)) \quad (4)$$

3. Research Methods

This study functions a methodology that can be used to analyze the relationship between factors influencing endogenous economic growth amidst global uncertainties. The study adopts a quantitative approach, utilizing data from 1990 to 2022 sourced from the World Bank and Penn World Table. The dependent variable in this analysis is Total Factor Productivity (TFP), a measure of a country's economic efficiency. The independent variables incorporated in the model include FDI Net Inflows, Human Development Index (HDI), Employment, and R&D. The analytical method applied in this study is the Autoregressive Distributed Lag (ARDL), which enables the examination of the long-term and short-term relationships between the variables.

The use of the ARDL method allows the researcher to test the hypotheses related to the relationship between TFP and the aforementioned independent variables, considering the potential for a dynamic relationship in the long run. This approach also accounts for the long-term and short-term effects of the independent variables on TFP, thereby providing a comprehensive understanding of the factors influencing economic growth in the context of global uncertainty.

The research model applied is the ARDL model as per Ghosh, T., et. al., (2021), Orji, et.al, (2020), and Kripfganz, S., et.al, (2023):

$$\begin{aligned}\Delta TFP_t = {} & \alpha_0 + \sum \beta_i \Delta TFP_{\{t-i\}} + \sum \gamma_j \Delta FDI_{\{t-j\}} + \sum \delta_k \Delta R\&D_{\{t-k\}} + \sum \varepsilon_l \Delta HDI_{\{t-l\}} \\ & + \sum \zeta_m \Delta L_{\{t-m\}} + \theta_1 TFP_{\{t-1\}} + \theta_2 FDI_{\{t-1\}} + \theta_3 R\&D_{\{t-1\}} + \theta_4 HDI_{\{t-1\}} \\ & + \theta_5 L_{\{t-1\}} + u_t\end{aligned}$$

Description:

- Δ is the first difference operator.
- TFP_t is the Total Factor Productivity at time period t.
- FDI_t is Foreign Direct Investment in time period t.
- $R\&D_t$ is the R&D expenditure in time period t.
- HDI_t is human capital development; where it is emphasized on the Human Development Index (HDI) at time period t.
- L_t is the labor force where it is means Employment in time period t.
- α_0 is a constant.
- $\beta_i, \gamma_j, \delta_k, \varepsilon_l$ and ζ_m is the short-run coefficient.
- $\theta_1, \theta_2, \theta_3, \theta_4$, and θ_5 is the long-run coefficient.
- u_t is the error term at time period t.
- i, j, k, l, m is lag-order.

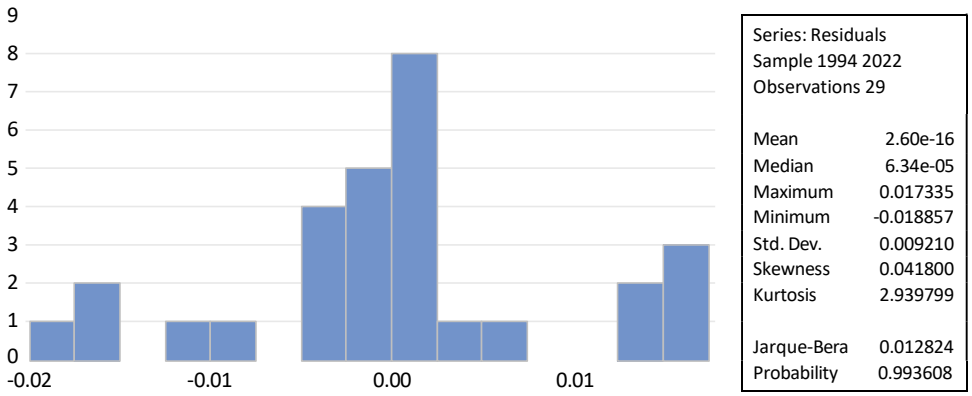
Thus, the ARDL method was chosen for its ability to capture the complex dynamics between these variables and provide a solid analytical foundation for understanding economic resilience strategies.

4. Results and Discussion

4.1.1. Normality Test

The validity of the significance test, which examines the impact of the independent variable on the dependent variable, hinges on the normal distribution of the research data. A normality test is necessary to determine if the residuals are normally distributed. In this study, the Jarque-Bera method was used to conduct the normality test.

Graph 4.1.1. Normality Test Results



Source: Data processed by Eviews (2024)

The test results show that the JB probability value is greater than α = 5%. So, it can be concluded that this research data is normally distributed.

4.1.2. Stationarity Test Results

Table 4.1.2. Stationarity Test Results

Variable	ADF Statistic	Critical Value 1%	Critical Value 5%	Critical Value 10%	Prob	Description
TFP	-4.08276	-3.66166	-2.96041	-2.61916	0.0035	Stationer
FDI-Inflow	-5.36103	-3.66166	-2.96041	-2.61916	0.0001	Stationer
HDI	-4.46309	-3.66166	-2.96041	-2.61916	0.0013	Stationer
Employment	-4.29685	-3.66166	-2.96041	-2.61916	0.0020	Stationer
R&D	-5.99464	-3.66166	-2.96041	-2.61916	0.0000	Stationer

Source: Data processed by Eviews (2024)

The stationarity test results in Table above indicate that all research variables are stationary at the level stage. This is evidenced by the ADF statistic values being smaller than the critical values at 1%, 5%, and 10%, allowing for the next stage of testing to be conducted.

4.1.3. Autocorrelation Test

Table 4.1.3. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 4 lags

F-statistic	3.140713	Prob. F(4,4)	0.1468
Obs*R-squared	21.99638	Prob. Chi-Square(4)	0.0002

Source: Data processed by Eviews (2024)

Based on the test results in Table, it can be seen that the probability value of F is 0.1468, which is greater than α = 5%. This indicates that there is no autocorrelation problem in the research model.

4.1.4. Heterokedasticity Test

The heteroskedasticity test in this study uses the Breusch-Pagan-Godfrey method by comparing the probability value of Obs*R-Square with its critical value (α = 5%).

Table 4.1.4. Heterkedasticity Test Result

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.286154	Prob. F(20,8)	0.3730
Obs*R-squared	22.12044	Prob. Chi-Square(20)	0.3340
Scaled explained SS	1.632692	Prob. Chi-Square(20)	1.0000

Source: Data processed by Eviews (2024)

Based on Table, it can be seen that the heteroskedasticity test results using the Breusch-Pagan-Godfrey method show that the probability value of F (0.3730) is greater than its critical value (α = 5%). This indicates that the ARDL model exhibits homoscedasticity, meaning there is a uniform variance of residuals across all observations.

4.1.5. Multicollinearity test

Table 4.1.5. Multicollinearity Test Result

Variance Inflation Factors
Date: 05/20/24 Time: 05:16
Sample: 1990 2022

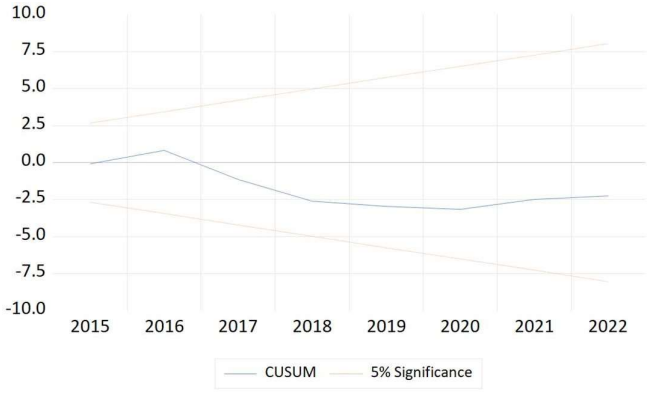
Variable	Coefficient Variance	Uncentered VIF	Centered VIF
D(RD(-1))	0.027201	1.093936	1.040837
D(EMPLOYMENT(-1))	5.41E-05	1.062030	1.060558
D(HDI(-1))	1.595153	3.121033	1.168204
D(FDI_INFLOWS(-1))	3.21E-05	1.197963	1.197275
C	8.64E-05	3.103586	NA

Source: Data processed by Eviews (2024)

The data at hand suggests that our model is free from multicollinearity. This inference is based on the results of the Variance Inflation Factor (VIF) test, where all variables display VIF values under the standard cut-off of 5 or 10, signifying an absence of significant multicollinearity. As a result, the model is considered suitable for additional examination and interpretation. This thorough validation bolsters the dependability and accuracy of the model, thereby strengthening the credibility of the conclusions drawn from it.

4.1.6. Stability Test

CUSUM Test



Source: Data processed by Eviews (2024)

The stability assessment carried out using the Cumulative Sum (CUSUM) method leads us to reject the null hypothesis (H0) that posits significant changes at a 5% significance level. This rejection suggests that the empirical model being examined displays consistent stability throughout the period of observation. Consequently, we can infer that the empirical model maintains stability during the observation period. Hence, we accept the alternative hypothesis (H1) which proposes that the model is stable.

4.1.7. Results of Autoregressive Distributed Lag (ARDL) Model Estimation

Table 4.1.7.1. ARDL Model Estimation

Dependent Variable: TFP
Method: ARDL
Automatic-lag linear regressors (4 max. lags): HDI FDI_INFLOWS RD EMPLOYMENT
Selected model: ARDL(4,0,4,4,4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
TFP(-1)	-0.619245	0.351098	-1.763740	0.1158
TFP(-2)	-1.456913	0.319788	-4.555865	0.0019
TFP(-3)	-0.171409	0.332641	-0.515298	0.6203
TFP(-4)	-0.896413	0.289647	-3.094846	0.0148
HDI	-3.856999	0.844843	-4.565346	0.0018
FDI_INFLOWS	0.051422	0.007069	7.274119	0.0001
FDI_INFLOWS(-1)	0.047342	0.014030	3.374406	0.0097
FDI_INFLOWS(-2)	0.032382	0.010732	3.017249	0.0166
FDI_INFLOWS(-3)	0.004212	0.006973	0.604069	0.5625
FDI_INFLOWS(-4)	0.034432	0.009185	3.748747	0.0056
RD	0.404541	0.172521	2.344881	0.0471
RD(-1)	0.348186	0.204070	1.706207	0.1264
RD(-2)	1.489482	0.285600	5.215266	0.0008
RD(-3)	0.464151	0.255493	1.816692	0.1068
RD(-4)	0.305319	0.176405	1.730785	0.1217
EMPLOYMENT	0.010808	0.011942	0.904986	0.3919
EMPLOYMENT(-1)	0.058511	0.017426	3.357704	0.0100
EMPLOYMENT(-2)	-0.030574	0.016163	-1.891656	0.0952
EMPLOYMENT(-3)	0.054399	0.016003	3.399317	0.0094
EMPLOYMENT(-4)	-0.029329	0.009215	-3.182771	0.0129
C	1.705335	0.510502	3.340506	0.0102

R-squared	0.986761	Mean dependent var	0.917403
Adjusted R-squared	0.953665	S.D. dependent var	0.080050
S.E. of regression	0.017231	Akaike info criterion	-5.123769
Sum squared resid	0.002375	Schwarz criterion	-4.133658
Log likelihood	95.29465	Hannan-Quinn criter.	-4.813678
F-statistic	29.81488	Durbin-Watson stat	2.249534
Prob(F-statistic)	0.000020		

*Note: p-values and any subsequent test results do not account for model selection.

Source: Data processed by Eviews (2024)

Based on the ARDL model results, here are the interpretations for the significant variables at their respective lags. Foreign Direct Investment (FDI) inflows play a significant role, on the current level, the first, second, and fourth lags contributing to TFP growth. Research and Development (RD) expenditure positively affects TFP, particularly on the current level and the second lag of RD. Employment also plays a role, with significance effects observed at various lags. Overall, the model explains approximately 98.68% of TFP variation, indicating a robust fit to the data. These results underscore the importance of fostering innovation (through R&D and FDI) to enhance productivity and economic performance. Policymakers might prioritize these factors to promote sustainable growth and competitiveness.

4.1.7.2. Long term measurement

Table 4.1.7.2.1. Cointegration Bound Test Results

Test Statistic	Value	K
F- Statistic	5.997010	4
Significancy	I (0) Bound	I (I) Bound
10%	2.200	3.090
5%	2.560	3.490
1%	3.290	4.370

Source: Data processed by Eviews (2024)

The results of the Cointegration Bound Test in the table above show that the F-statistic value (5.997010) is greater than the I(0) and I(1) values at the 10%, 5% and 1% significance level. The ARDL model estimation, indicated by the significant value of the F-test Bounds statistic, demonstrates the presence of a long-term cointegration between TFP and the explanatory variables.

Table 4.1.7.2.2. Long term Error Correction Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ*	-4.143980	0.541936	-7.646624	0.0000
D(TFP(-1))	2.524735	0.388515	6.498416	0.0000
D(FDI_INFLOWS(-1))	-0.071027	0.012813	-5.543279	0.0001
D(RD(-1))	-2.258952	0.335636	-6.730370	0.0000
D(EMPLOYMENT(-1))	0.005503	0.005565	0.988945	0.3407

Source: Data processed by Eviews (2024)

The author uses the error correction test to measure long-run cointegration for each variable (Ghosh, T., et al., 2021). The error correction test results for each coefficient show that TFP, FDI inflows, and RD coefficients indicate a significant impact on the long-run cointegration of the model.

4.1.8. Elasticity measurement

Table. 4.1.8.1. elasticity labor force to growth
Scaled Coefficients
Date: 05/20/24 Time: 19:31
Sample: 1990 2019
Included observations: 30

Variable	Coefficient	Standardized Coefficient	Elasticity at Means
C	0.139436	NA	0.028235
EMPLOYMENT	0.076124	0.031670	0.971765

Source: Data processed by Eviews (2024)

Scaled Coefficients
Date: 05/20/24 Time: 22:43
Sample: 2020 2022
Included observations: 3

Variable	Coefficient	Standardized Coefficient	Elasticity at Means
C	70.31233	NA	30.36752
EMPLOYMENT	-1.059230	-0.201775	-29.36752

Source: Data processed by Eviews (2024)

The elasticity of employment with respect to growth is a measure of inclusive development, as discussed in Dartanto's journal (2013). From 1990 to 2019, this relationship was positive, while from 2020 to 2022, it turned negative. In other words, during the earlier period, employment tended to increase alongside economic growth. However, the impact of the COVID-19 pandemic likely contributed to the reversal of this trend in recent years.

Table 4.1.8.2 Elasticity labor force to RD

Scaled Coefficients
Date: 05/20/24 Time: 19:19
Sample: 1990 2022
Included observations: 33

Variable	Coefficient	Standardized Coefficient	Elasticity at Means
C	-1.297445	NA	-10.48664
EMPLOYMENT	0.022506	0.390738	11.48664

Source: Data processed by Eviews (2024)

The elasticity of employment is positive. This means that an increase in employment is expected to result in positive increase in the RD variable, assuming all other variables remain constant.

4.2. Discussion

From the results, as we had identified, on current level, the first, second, fourth lags of FDI play a role in driving TFP growth. Encouraging FDI inflows through supportive policies and incentives can foster innovation and competitiveness. R&D spending significantly impacts TFP, especially on the current level and the second lag of RD. Promoting R&D investment by creating an enabling environment for research and innovation is essential. Employment also plays a role, with significant effects observed at various lags. Based on the result, from 1990 to 2019, employment and economic growth had a positive relationship as the economy expanded. However, from 2020 to 2022, this trend reversed, likely due to the impact of the COVID-19 pandemic. Addressing employment challenges arising from crises (like pandemics) is imperative to maintaining a positive employment-growth relationship. The interplay between employment and R&D resembles a tightrope walker's balance. As employment sways, so does the RD variable, a subtle alignment of progress. In this intricate performance, policymakers might compose harmonious policies that nurture both workforce development and innovation, ensuring sustained prosperity. Cooperation and shared vision among important stakeholders are essential to leverage R&D investments for long-term economic prosperity.

To enhance human capital, it is crucial to strengthen training programs and establish connections between education and industry. A skilled workforce significantly contributes to productivity gains and fosters innovation. By promoting lifelong learning and upskilling, individuals can adapt to changing economic demands, maintaining an agile and competitive workforce.

Private investment in research and development (R&D) is essential for driving technological advancements (WIPO, 2023). Partnership among industry, researcher, and government plays a pivotal role in this progress. Governments might responsible for managing R&D expenditure data, conducting examinations, and verifying information from various sources, including international organizations like the World Bank. Entice firms to engage in innovative activities stimulates R&D efforts, leading to breakthroughs that benefit the overall economy. Grants, venture capital, and tax credits can further boost R&D investment.

Creating a conducive business environment by streamlining regulations is crucial for attracting Foreign Direct Investment (FDI). Countries that support investment tend to achieve higher economic growth rates. Multinational corporations facilitate knowledge transfer and technology spillovers, contributing significantly to overall economic development. Policymakers might explore innovative financing models like public-private partnerships and investment promotion agencies to attract FDI. Developing resilience strategies to mitigate the impact of future crises on employment and economic growth is vital. Providing support to affected sectors and business units during downturns ensures stability and minimizes disruptions.

In the long run, the disparity between anticipated long-term development and current socio-economic conditions calls for a revaluation of our vision for the future. This involves reassessing and realigning existing policies with the factors that drive best practice performance. This includes significant investments in infrastructure development, strategic investments in improving the quality of human resources by aligning the education system's processes and outcomes with both the current and future skill demands of the labor market, and investing in programs for reskilling and upskilling the workforce while also improving labor policies. It also involves strengthening and empowering micro, small, and medium-sized enterprises in the economy. However, the rapid development and implementation of digitalization across all sectors of the economy, all segments of society, and in both rural and urban areas should be the central focus of the development strategy. This will create a supportive environment that strengthens and deepens the country's increased participation in global trade, facilitates the relocation of global firms to Indonesia, and promotes research and development in both urban and rural area (Wahyudi, S.T., et al., 2021 and Ssenyonga,M., et al., 2021), also the progression of a regulatory environment conducive to innovation and the protection of intellectual property rights (Ssenyonga,M., et al., 2021).

5. Comprehensions

Increased investment in research and development (R&D) not only aids economic recovery but also nurtures economic progress and prosperity by boosting market spending and economic activity through amplification and overflow effects to other business segments. In addition to these benefits, R&D investment can provide various advantages to businesses. Businesses can gain a competitive advantage by developing innovative products, services, and technologies through R&D, allowing them to stay ahead of competitors and attract more customers. Moreover, R&D enables businesses to explore new markets and expand their customer base, tap into previously untapped markets, and reach a wider audience. It leads to process improvements and technological advancements, enhancing efficiency and productivity within a business. By streamlining operations and adopting innovative technologies, businesses can optimize their resources and achieve higher levels of productivity. Additionally, increased R&D investment can open doors for partnerships with other businesses, research institutions, and academia, leading to shared knowledge, resources, and expertise, accelerating innovation and creating mutually beneficial opportunities. These business benefits of increased investment in R&D contribute to the long-term growth in a post-COVID recovery phase.
Innovative financing solutions provided by financial services play a push role in supporting increased investment in research and development. By offering tailored financial products and services designed to meet the specific needs of businesses engaged in R&D activities, financial services can facilitate access to funding and enable companies to pursue innovative projects. Collaborative efforts between financial services and businesses in the realm of R&D financing can further enhance the impact of research initiatives, fuelling technological advancements, and fostering economic growth. This innovative approach to financing contributes to creating a conducive environment for research and development, ultimately driving sustainable economic progress and competitiveness. Risk management is essential in the context of research and development activities, especially in the post-COVID recovery phase. Businesses need to assess and mitigate potential risks associated with R&D investments to ensure the sustainability of their initiatives. Financial services can play a push role in providing risk management expertise and financial instruments that help businesses navigate uncertainties and safeguard their R&D projects. By implementing effective risk management strategies, businesses can protect their investments, enhance resilience, and optimize the outcomes of their research and development endeavours. Collective risk management efforts between businesses, financial services, and other stakeholders are essential to ensure the successful implementation of R&D projects and the long-term sustainability of economic growth.

Effective communication and dialogue between investors and the government in a two-way, autonomous manner stand essential for achieving consent. Open channels of communication allow for transparent exchanges of ideas, concerns, and feedback between investors and government entities. By fostering dialogue that promotes active listening and mutual understanding, both parties can work towards harmony on policies, regulations, and initiatives related to research and development. An autonomous approach to communication ensures that stakeholders have the freedom to express their perspectives and engage in constructive discussions to reach mutually beneficial agreements. This consent driven process between investors and the government can lead to the development of effective strategies that support R&D investment, economic growth, and sustainable development in Indonesia.

Countries grow by diversifying into new products of increasing complexity. Given its current exports, some of the sectors with high potential for new diversification in Indonesia are: Electrical machinery and equipment and Apparatuses (optical, medical, etc.). Complexity more complex products tend to support higher wages. Opportunity gain for future diversification: higher values hold more linkages to other high-complexity products, opening more opportunities for continued diversification (Harvard, 2024).

In the context of sustainable economic growth and global competitiveness, research and development are important. During periods of economic uncertainty, robust R&D initiatives can lead to breakthroughs in addressing critical social challenges. Indonesia's demographic landscape, characterized by a significant working-age population, presents a unique opportunity for business ventures. Strategic measures are essential to push productivity and create quality and opportunities for this workforce segment. By investing in human capital and effectively maximize utilizing the potential of the working-age population, businesses can identify and capitalize on emerging market opportunities, driving economic growth and enhancing Indonesia's global competitiveness. This approach contributes to the sustainable development of the Indonesian economy.

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