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# Economic Complexity and Sustainable Growth in Developing Countries

**Lilis Hoeriyah[1]✉, [2]Nunung Nuryartono, [3]Syamsul Hidayat Pasaribu**
Economics Department, Faculty of Economics and Management, IPB University

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## Abstract

Most developing countries in this study are middle to low-income countries that have a relatively low economic complexity. This study aims to analyze the effect of the economic complexity on economic growth in 86 developing countries in 2010-2019. The method used is the Generalized Method of Moments (GMM) to capture dynamic panel analysis. The estimation results using the System GMM show that economic complexity has a positive effect on economic growth in developing countries. Increasing economic complexity encourages a structural transformation through high value-added economic sectors' creation to produce more complex products for earning a higher income. Human capital does not have a significant effect on economic growth because developing countries have relatively low-quality workers both in terms of education and health. The human capital development and government spending on the health sector are necessary to accelerate sustainable economic growth



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✉ Corresponding author :
Address Gedung FEM Lantai 2 Jl. Agatis, IPB Dramaga Campus, Bogor – Indonesia 16680
E-mail: lilishoeriyah96@gmail.com

## INTRODUCTION

Global income inequality shows the bottom 90% group's share of 18.3% to total global wealth in 2019. Besides, the top 10% group share has decreased relatively small since 2010 by 83.9% to 81.7% in 2019 (Credit Suisse, 2019). It is not in line with Kuznets' inverted U-curve that illustrates that at first, an increase in per capita income will worsen the income distribution. Later, increasing per capita income will encourage a more even income distribution. However, rising income inequality has accompanied the increase in global income so that the income gap between countries is getting bigger.

Pro-growth policies such as taxes and transfers often affect the income levels of social groups differently (Causa et al. 2015; Jalles and Mello 2019). In recent years, the literature has emphasized that one of the main causes of large income disparities is economic complexity, i.e., the amount of productive knowledge or capabilities accumulated in a country's production structure (Utkovski et al. 2018).

Economic development involves not only increases in economic size, but also entails variations in technology, human capital, and institutions. All these factors are defined as non-tradeable capabilities, which determine a countries productivity level. These capabilities are captured by the economic complexity index, which measures productive capabilities embedded in economic structures. An economy is complex if it can produce a diverse range of products (diversity) that are not widely produced by many other countries (ubiquity). Complexity reveals information about a country's human capital, technology, and institutions. It is strongly correlated with economic performance (Hidalgo and Hausmann 2009).

Economic complexity reflects a high degree of knowledge accumulation and encourages the development of highly skilled workers who have the opportunity to obtain higher income levels. Access to education and health are becoming more extensive, thereby increasing labor productivity. As with the findings of Hausmann et al. (2011) believes that productivity is the driving force of growth and prosperity.

High-income countries have higher economic complexity than middle and low-income countries (Zhu and Li 2016). The type of product exported determines the wealth (Felipe et al. 2010). The extractive industries dominate the structural production of the world's poorest countries. These countries must shift to more productive economic sectors. Countries that have a high accumulation of knowledge will produce the most complex products. Economic complexity describes information about the structure of production, income, and future growth (Hausmann et al. 2011; Yildirim 2014).

Economic complexity has a positive effect on economic growth (Hausmann et al. 2011; Ourens 2013; Bastos and Wang 2015; Zhu and Li 2016; Stojkoski and Kocarev 2017). There was a finding that economic complexity has a negative effect on economic growth in innovation-based countries (Demiral 2016). It shows that complexity is increasing over time. In addition, not all countries have succeeded in transforming their production structures, due to limited education, infrastructure, innovation policies, and access to financial institutions (Jankowska et al. 2012).

Economic growth depends on the ability to accumulate the knowledge to produce products or goods that are diverse and more complex or have high value-added. It requires countries to increase their capabilities to create higher value-added economic sectors. Higher productivity and higher income levels drive economic diversification that makes a more complex economy (Hidalgo et al. 2007; Hidalgo and Hausmann 2009; Hausmann et al. 2011).

Countries that have great performance have succeeded in diversifying their economic structures into more complex industrial products and creating wider job opportunities. Diversification of agricultural products and extractive industries into manufactured products that produce higher value-added shows structural transformation (Hartmann et al. 2016).

Increasing economic complexity leads to higher and more stable income levels. Hartmann et al. (2016) explained that economic complexity is a relevant measure of welfare because economic growth and average income relate to absolute poverty and social welfare.

Economic complexity previous studies consist of case studies or cross-country analyses that mostly examine developing countries. A strategy to achieve economic growth convergence with developed countries using economic complexity. Cross-country studies such as research by Felipe et al. (2014), Bastos and Wang (2015), and Zhu and Li (2016). Case studies such as Khan et al. (2020) and Poncet and Starosta de Waldemar (2013) studied China, Abdon and Felipe (2011) who studied Sub-Saharan Africa, Jankowska et al. (2012) who compared Asian and Latin American countries, Bayudan-Dacuycuy and Lim (2014) who examined the export portfolios of the Association of Southeast Asian Nations (ASEAN) countries.

Previous research in developed countries only described the production structure and its product space, not including economic complexity as a driver of economic growth. Buccellato and Coro (2019) analyze convergence in the European region based on heterogeneous production structures. It is a research development from Stojkoski and Kocarev (2017) that examined the relationship between economic complexity and growth in Southeast and Central Europe.

Based on the description that has been explained, this study aims to analyze the effect of economic complexity on economic growth in cross-country analysis. The scope used includes middle and low-income countries according to the World Bank (2021) classification with a research period during 2010-2019 based on the availability of the most complete and latest data. The countries studied are countries that have economic complexity ranking published by the Atlas of Economic Complexity database. The classification of countries used can capture the effect of relatively low economic complexity, whether it can encourage an increase in income levels so that growth becomes sustainable as one of the goals of sustainable development (8th goal).

## RESEARCH METHODS

The data used in this study is secondary data in the form of panel data from 2010-2019. The grouping of countries refers to the classification of the World Bank (2021) that classifies countries based on the income level (GNI per capita) that consists of high-income, upper-middle, lower-middle and low-income countries. The selected countries are 86 countries out of 133 countries that have an economic complexity ranking by the Atlas of Economic Complexity. These countries are middle and low-income countries that reflect one of the developing countries' characteristics (see Appendix).

The dependent variable in this study is measured using real GDP per capita. The main independent variable is the economic complexity index constructed by Hidalgo and Hausmann (2009). ECI measures the complexity of a country's production structure by combining information about the diversity of products exported by a country and product ubiquity (the number of countries that export a product) (Hidalgo and Hausmann 2009). ECI is calculated using data on exports of products of each country with a Revealed Comparative Advantage (RCA ≥ 1). The RCA of country c in product p can be expressed as:

$$RCA_{cp} = \frac{X_{cp} / \sum_p X_{cp}}{\sum_c X_{cp} / \sum_{cp} X_{cp}} \quad \text{.....(1)}$$

Where $X_{cp}$ is the export value of product p exported by country c, $\sum_c X_{cp}$ is the total export value of all products exported by country c, $\sum_p X_{cp}$ is the total export value of product p exported by all countries in the world and $\sum_{cp} X_{cp}$ is the total value of world exports (all products exported worldwide).

A country is said to be complex if it is able to export a variety of products with RCA ≥ 1 (high diversity) while a complex product if exported by a few countries (low ubiquity) (Hidalgo and Hausmann 2009). RCA is used to

define a discrete matrix $M_{cp}$ which is equal to 1 i country c has RCA for product p and 0 otherwise.

$M_{cp} = 1$ if RCA $\geq 1$ ..... (2)

$M_{cp} = 0$ if RCA $< 1$ ..... (3)

$M_{cp}$ matrix allows to determine the diversity and ubiquity of a country's products, respectively as the number of products exported by a country with a comparative advantage and the number of countries exporting products with a comparative advantage.

$Diversity = k_{c,0} = \sum_p M_{cp}$ ..... (4)

$Ubiquity = k_{p,0} = \sum_c M_{cp}$ ..... (5)

Next, the matrix linking countries exporting similar products, weighted by the inverse of a product's ubiquity (to discount common products) and normalized by country diversity:

$\tilde{M}_{cc'} = \frac{1}{k_{c,0}} \sum_p \frac{M_{cp} M_{c'p}}{k_{p,0}}$ ..... (6)

The next equation is the Economic complexity (ECI), the calculation is written as follows:

$ECI_c = \frac{K_c - K}{std(K)}$ . ..... (7)

The control variable used is human capital which consists of the duration of primary, secondary education and life expectancy. Health sector government spending, fixed capital formation, inflation, and unemployment are also included as other control variables. Data obtained from the World Bank and the Atlas of Economic Complexity database.

The estimation of the research model will use dynamic panel data to estimate the effect of economic complexity on economic growth as shown in the modified and developed equation of Hausmann et al. (2014), Zhu and Li (2016), Stojkoski and Kocarev (2017) and Ali et al. (2018).

$$LogPIC_{it} = \alpha_0 + \alpha_1 LogPIC_{i,t-1} + \alpha_2 ECI_{it} + \alpha_3 LogEDUP_{it} + \alpha_4 LogEDUS_{it} + \alpha_5 LogLIFE_{it} + \alpha_6 GOVH_{it} + \alpha_7 GCF_{it} + \alpha_8 INF_{it} + \alpha_9 UNEMP_{it}\ \varepsilon_{it}$$ .....(8)

Where $LogPIC_{it}$ is GDP per capita as a proxy economic growth (US$), $LogPIC_{i,t-1}$ is the economic growth in the previous year (US$), $ECI_{it}$ is the economic complexity index, $LogEDUP_{it}$ is primary education as a proxy of the human capital (years), $LogEDUS_{it}$ is secondary education as a proxy of human capital (years), $LogLIFE_{it}$ is life expectancy as a proxy of the human capital health (year), $GOVH_{it}$ is government expenditure in health sector (percent), $GCF_{it}$ is the gross capital formation (percent), $INF_{it}$ is inflation (percent), $UNEMP_{it}$ is unemployment rate (percent), $\varepsilon_{it}$ is error term, $\alpha_0, \beta_0$ is intercept and $\alpha_n, \beta_n$ is slope (n = 1,2,…).

When the dependent variable lag is entered into the model, it will cause endogeneity problems resulting in biased and inconsistent estimators. Arellano and Bond (1991) proposed a method of moments approach or the so-called Generalized Method of Moment (GMM). There are two estimation procedures commonly used in the GMM framework, namely First-differences GMM (FD-GMM) and System GMM (SYS-GMM).

## RESULTS AND DISCUSSION

Economic growth in developing countries during the last two decades has fluctuated. The developing countries studied that consist of middle and lower-income countries tend to have higher GDP per capita growth rates than high-income countries. According to figure 1, the growth fluctuation in upper and lower-middle-income countries tends to be in line with the high-income countries' growth. In contrast to low-income countries, which had a slowdown in growth and even tended to decline in the long term.

Most developing countries have low and middle-income countries and high rates of poverty and unemployment, reaching double digits and moderate to high levels of income inequality. Developing countries' growth is expected to be higher than developed economies that are overall almost high-income countries. This condition indicates that the difference in income between the two countries groups will be

even greater due to higher growth in developed economies.

Low-income countries produce less complex products, resulting in low value-added and fluctuating prices, such as agricultural products. The income level obtained is relatively low due to the low productivity generated by the workforce. The limitations of the economic sector and expertise cause narrow and limited job opportunities that have the potential for unsustainable growth in the long term. Problems such as poverty, unemployment, and inequality tend to get worse.

The dynamic panel model specification test is conducted to ensure that the estimation method used met the best criteria. The criteria are, first, that the instrument is valid - there is no correlation between the instruments and the error component, indicated by the Sargan test results do not reject the null hypothesis (insignificant). Second, the estimator is consistent, indicated by the Arellano-Bond test results on AR(2) that do not reject the null hypothesis (insignificant). Based on the model specification test results, the best model used in this study is SYS-GMM because FD-GMM has weak instruments.

SYS-GMM estimation results in Table 1 show that the economic growth of the previous year has a strong influence in determining the economic growth of the following year. It relates to sustainability growth over time. The development of a country requires sustainable economic growth. Therefore, economic development not only requires a high growth rate but also requires a stable growth rate.

**Table 1.** Estimation Result of GMM Model

| **Variables** | **Dep. Var = GPD per capita (LogPIC)** | |
|---|---|---|
| | **First Difference GMM** | **System GMM** |
| $LogPIC_{t-1}$ | 0.903*** | 0.917*** |
| | (0.000) | (0.000) |
| ECI | -0.009 | 0.020** |
| | (0.147) | (0.035) |
| LogEDUP | 0.064 | -0.170 |
| | (0.227) | (0.153) |
| LogEDUS | 0.029 | 0.032 |
| | (0.259) | (0.385) |
| LogLIFE | -0.022 | 0.020 |
| | (0.762) | (0.866) |
| GOVH | 0.0002 | 0.001 |
| | (0.708) | (0.117) |
| GCF | 0.0004 | 0.0001 |
| | (0.256) | (0.659) |
| INF | -0.0004*** | -0.0004*** |
| | (0.000) | (0.000) |
| UNEMP | -0.004*** | -0.005*** |
| | (0.000) | (0.000) |
| Cons | 0.836 | 0.928 |
| | (0.004) | (0.073) |
| Arellano Bond test, AR (2) | (0.780) | (0.382) |
| Sargan test | (0.256) | (0.140) |

Note: ***, **, * sigificant at 1%, 5%, 10%, respectively.
Source: Data processed, 2021

The figure 1 and 2 are represents the annual growth of GDP percapita and The Relationship between GDP per capita and Economic Complexity in Asian Developing Countries from 2010 until 2019 years period.

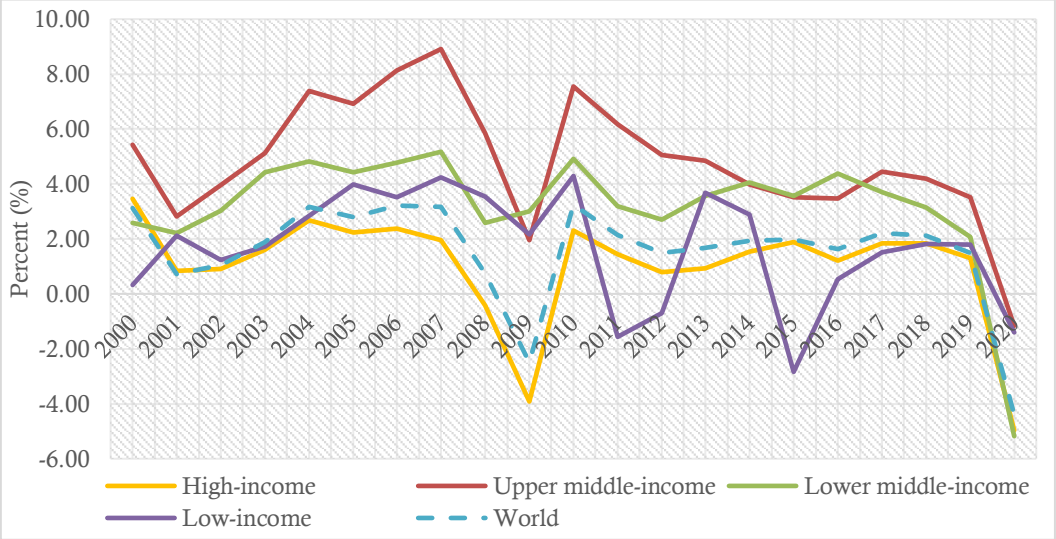


**Figure 1.** Annual growth of GDP per capita, 2000-2020
Source: World Bank, 2021

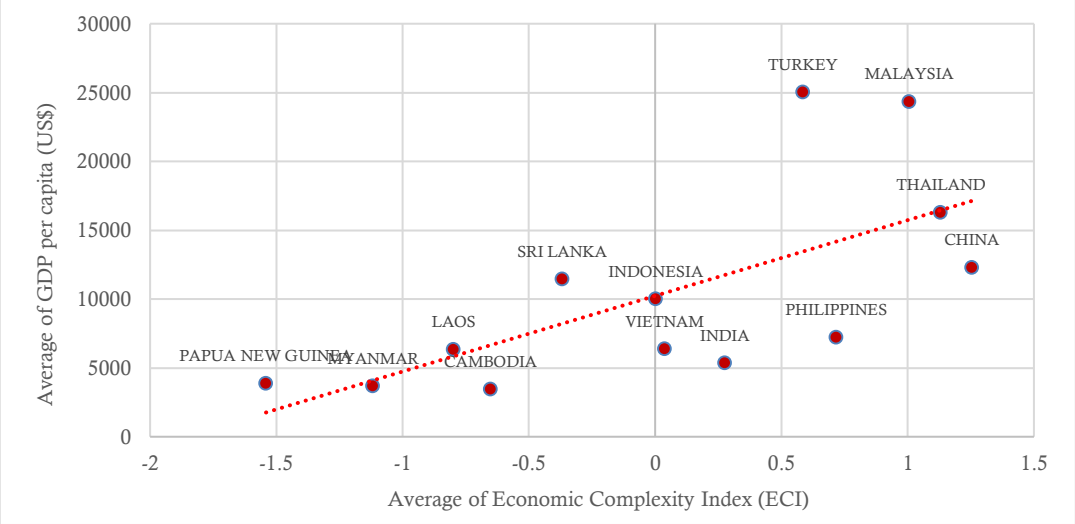


**Figure 2.** The Relationship between GDP per capita and Economic Complexity in Asian Developing Countries, 2010-2019
Source: World Bank and Atlas of Economic Complexity 2021.

The development of a country is influenced by its capacity to accumulate the capabilities needed to produce a variety of more complex products (Abdon et al. 2010). Countries with higher economic complexity have the potential to earn higher income levels. An increase of 1 unit of the economic complexity index in developing countries increases economic growth by 0.91%, ceteris paribus. Then, according to figure 2, economic complexity and income have a positive relationship in developing countries. This figure reflects the trends of economic complexity and income level that occurs in several developing Asian countries. The increase in economic complexity leads to an increase in the income level.

Growth and development imply a process of structural transformation and technological change. Each country has different capacities for diversification and structural transformation, as found by Bastos and Wang (2015). The economic

diversification and complexity in developing countries are still relatively low. This is one of the reasons for the large differences in income between countries. Higher value-added new sectors creation provide a better and wider choice of jobs. Higher economic complexity allows a country to earn higher income levels, finally higher economic growth can be achieved sustainably in a relatively long time.

Countries whose economic structures are geared toward complex products develop faster than countries that produce simple or less complex products (Felipe et al. 2012). The shift from simple products that have low productivity to complex products that have higher productivity and skill-intensive activities is a structural transformation. We can observe the process starting from what a country is producing. In this case, developing countries most produce simple products such as agriculture products, mining, minerals, that use low technology.

The driving factor behind the structural transformation was the change in productivity in the higher value-added sector, which was dominated by manufacturing. This is also marked by the movement of labor from labor-intensive activities to skill-intensive activities.

The Labor movement is strongly influenced by the existence of opportunities in skill-intensive sectors because, even if these opportunities exist, workers may only move to new sectors if they are properly trained to be absorbed by the sector. Therefore, the existing workforce will need the necessary training before moving to a new sector. The productivity of the labor force will change and result in changes in the structure of the economy. The growth and development of a complex sector depend on the institutional environment and the availability of suitable human resources. Complex sector growth will result in structural changes.

Japan, as the most complex country, has a composition of high-value-added export products such as ICT, vehicles, electronics, and machinery. Unlike Nigeria, which is the least complex country, its export structure is dominated by crude oil, petroleum gas, and cocoa beans, which have low value-added. Complex products exported by Japan are linked to the production of other products, resulting in higher value-added. The increase in labor productivity will increase along with the accumulation of knowledge and capabilities due to the increasing economic complexity, which encourages an increase in the number of high-skilled workers. Hence, the structural transformation depends on the quality of the workforce. These results also support the research of Hidalgo and Hausmann (2009), Ourens (2013), Hartmann (2014) and Hartmann et al. (2017).

The key driver of increasing economic complexity depends on human capital development accompanying structural transformation. It is necessary to improve worker productivity through health and education as basic needs for workers. Economically, they are the human capital basis to encourage the economic productivity of each individual. A higher education level leads to an increase in labor productivity and income, and also a decrease in poverty rates. Better quality societies and access to education provide a better quality of life and economic opportunities for their citizens. At the same time, it is able to reduce the poverty and inequality rates (Agrawal 2008).

Human capital is expected to increase productivity, innovation, and entrepreneurial activities. According to Demiral (2016), knowledge is the main driver of increasing productivity and economic growth, especially in knowledge-based developed countries. Endogenous growth theory states that human capital is a key driver of economic growth. Education quality is one component that reflects human capital to accumulate knowledge and improve skills.

In this study, education is reflected by primary and secondary education. According to the estimation results, primary and secondary education have insignificant effects on economic growth in developing countries. Developing countries have a low living standard so that the longer periods are not effective to improve human capital capabilities. There are still many

people living below the international poverty line of US$1.9/day. In line with Zhu and Li (2016), increasing access to primary and secondary education is more important to increase productivity in producing final products and adopting technology in developing countries.

Infrastructure improvement is necessary to support better education, such as increasing the number of schools and roads access. Referring to the research of Ali et al. (2018), human capital only plays a positive role when institutions can create better economic opportunities and high-quality legal institutions. Meanwhile, we know that developing countries tend to have limitations in this regard.

Human capital is also reflected by the health quality, the higher life expectancy reflects better health conditions. It is a consideration that can encourage labor productivity. The increase in life expectancy is insignificant on economic growth in developing countries. Developing countries have low health quality, as reflected in the relatively shorter life expectancy.

Overall, human capital has no effect on the economic growth of developing countries. Education and health indicators need extra attention to encourage the improvement of the quality of human resources. Furthermore, one of the government's efforts to increase labor productivity is through optimizing health spending. However, the results of the model estimation sh ow that government spending on the health sector also does not have a significant effect on economic growth in developing countries, due to the low portion of health spending so that health problems cannot be handled properly. Oo (2019) stated that public spending should be directed to productive areas such as health. Residents in developing countries do not yet have the independence to access health services without depending on the government due to limited access, both economic and social.

The growth theory of Harrod-Domar and Solow states that the accumulation of physical capital is necessary to increase the production and investment capacity of a country. To develop production needs investment to provide capital for accelerating economic activities. But the gross capital formation does not have a significant impact on the economic growth in developing countries. The greater capital formation indicates a greater domestic saving capacity so that investment can be met from the domestic capital accumulation to drive economic growth. The results of this study also confirm the findings of Macek and Janku (2015), Ali (2017), and Stojkoski and Kocarev (2017).

On the other hand, inflation has a significant effect on economic growth. Macroeconomic stability through monetary policy by maintaining price stability can play a role in reducing poverty and inequality (Coeure 2012). Inflation in developing countries is relatively high, even reaching double digits in some countries. An increase in prices will make people reduce their consumption and cause potential output to decrease.

One of the macroeconomic goals to drive sustainable growth for each country is decreasing the unemployment rate. According to Aaronson et al. (2010) that analyze the factors that have generated the increase of long-term unemployment and the implication for future economic evolution. The estimation results show that unemployment has a negative significant effect on economic growth. Countries' development strategies are geared toward fostering economic prosperity and lowering unemployment. Besides, in order to reach incredible growth rates that would benefit the economy and increase labor demand and decent job creation, policymakers should develop policies that encourage and maintain rapid and sustainable economic growth (Conteh 2021).

Economic complexity creates a high knowledge accumulation and becomes a driver for human resources development. It is the key to the structural transformation process. The creation of high-value-added economic sectors results in higher productivity so that income levels increase. To achieve sustainable economic growth through the path of economic complexity, it is necessary to support various aspects, including human resource development and macroeconomic stability through the role of the government.

## CONCLUSION

The most of developing countries have relatively low income levels. The economic complexity encourages structural transformation by creating higher value-added economic sectors and wider job opportunities to absorb more workers so that the income earned will be higher. Improving the quality of human capital in developing countries is necessary to produce a high-skill workforce that have higher productivity and encourages structural transformation. Developing country governments play a role in maintaining macroeconomic stability that is conducive to improving the production structure, such as allocating budget spending for the productive sector so that the structural transformation process can be successfully realized to encourage sustainable growth in developing countries.

## REFERENCES


Aaronson, D, Mazumder, B, Schechter, S. (2010). What is behind the rise in long-term unemployment? *Economic Perspectives*, 28–51.

Abdon A, Bacate M, Felipe J, Kumar U. (2010). *Product Complexity and Economic Development* (The Levy Economics Institute of Bard College Working Paper.).

Abdon A, Felipe J. (2011). *The product space: What does it say about the opportunities for growth and structural transformation of Sub-Saharan Africa?* (The Levy Economics Institute of Bard College Working Paper).

Agrawal P. (2008). Economic Growth and Poverty Reduction: Evidence from Kazakhstan. *Asian Development Review*, *24*(2), 90–115.

Ali G. (2017). Gross Fixed Capital Formation and Economic Growth of Pakistan. *IMPACT, Journal of Modern Development in Social Sciences Research*, *1*(2), 25–34.

Ali M, Egbetokun A, Memon MH. (2018). Human Capital, Social Capabilities and Economic Growth. *Economies*, *6*(2), 1–18.

Arellano M, Bond S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment. *Review of Economic Studies Limited*, *58*, 67–77.

Bastos FR, Wang K. (2015). Long-Run Growth in Latin America and the Caribbean: The Role of Economic Diversification and Complexity. *Regional Economic Outlook*, 67–77.

Bayudan-Dacuycuy C, Lim JA. (2014). Export sophistication and export-led growth: An analysis of the export basket of selected East Asian economies. *MPRA Paper, Munich Personal RePEc Archive*, *64650*.

Buccellato T, Coro G. (2019). Relatedness, economic complexity, and convergence across European regions. In *University Ca' Foscari of Venice, Department of Economics Research Paper Series*.

Caldarelli G, Cristelli M, Gabrielli A, Pietronero L, Scala A, Tacchella A. (2012). A Network Analysis of Countries' Export Flows: Firm Grounds for the Building Blocks of the Economy. *PLOS ONE*, *7*(10), e47278.

Causa O, de Serres A, Ruiz N. (2015). Can Pro-growth Policies Lift All Boats? An Analysis Based on Household Disposable Income. *OECD Journal: Economic Studies*, 227–268.

Coeure B. (2012). What Can Monetary Policy Do About Inequality? *European Central Bank. Speech at the European Parliament in October. Brussels Franfurt Am Main, Germany*.

Conteh K. (2021). Economic Growth and Unemployment: An Empirical Assessment of Okun's Law in the Case of Liberia. *Preprints*, 1–13. https://doi.org/10.20944/preprints202105.0759.v1

Credit Suisse. (2019). *Global Wealth Databook 2019*.

Demiral M. (2016). Knowledge, Complexity and Economic Growth: Multi-country Evidence by Development Stages. *Journal of Knowledge Management, Economics and Information Technology*, *6*(1), 1–27.

Felipe J, Kumar U, Abdon A, Bacate M. (2012). Product Complexity and Economic Development. *Structural Change and Economic Dynamics*, *23*(1), 36–68.

Felipe J, Kumar U, Abdon A. (2014). How rich countries became rich and why poor countries remain poor: It's the economic structure…duh!*. *Japan and the World Economy*, *29*, 46–58. https://doi.org/10.1016/j.japwor.2013.11.004

Hartmann D. (2014). *Economic Complexity and Human Development: How Economic Diversification and Social Networks Affect Human Agency and Welfare*. Routledge.

Hartmann D, Jara-Figueroa C, Guevara M, Simoes A, Hidalgo CA. (2016). The Structural Constraints of Income Inequality in Latin

America. *Integration and Trade Journal*, *40*, 70–85.

Hartmann D, Guevara MR, Jara-Figueroa C, Aristarán M, Hidalgo CA. (2017). Linking Economic Complexity, Institutions, and Income Inequality. *World Development*, *93*, 75–93.

Hausmann R, Hidalgo CA, Bustos S, Coscia M, Chung S, Jimenez J. (2011). *The Atlas of Economic Complexity: Mapping Paths to Prosperity*. Puritan Press.

Hausmann R, Hidalgo CA, Bustos S, Coscia M, Simoes A, Yildirim MA. (2014). The Atlas of Economic Complexity: Mapping Paths to Prosperity. In *The Atlas of Economic Complexity: Mapping Paths to Prosperity*. The MIT Press.

Hidalgo CA, Klinger B, Barabasi AL, Hausmann R. (2007). The Product Space Conditions the Development of Nations. *Science*, *317*(5837), 482–10575.

Hidalgo CA, Hausmann R. (2009). The Building Blocks of Economic Complexity. *Proceedings of the National Academy of Sciences*, 10570–10575.

Jalles JT, Mello L. (2019). Cross-country Evidence on the Determinants of Inclusive Growth Episodes. *Review of Development Economics*, *23*(4), 1818–1839.

Jankowska A, Nagengast A, Perea JR. (2012). The Product Space and the Middle Income Trap: Comparing Asian and Latin American Experiences. *OECD Development Centre Working Papers*, *311*.

Kemp-Benedict E. (2014). An Interpretation and Critique of the Method of Reflections. *Munich Personal RePEc Archive (MPRA)*, *60705*, 1–16.

Khan H, Khan U, Khan MA. (2020). Causal nexus between economic complexity and FDI: Empirical evidence from time series analysis. *The Chinese Economy*, *53*(5), 1–21. https://doi.org/10.1080/10971475.2020.1730554

Macek R, Janku J. (2015). The Impact of Fiscal Policy on Economic Growth Depending on Institutional Conditions. *Acta Academica Karviniensia*, *15*(2), 95–107.

Oo TL. (2019). The Effect of Fiscal Policy on Economic Growth in Myanmar. *East Asian Community Review*.

Ourens G. (2013). Can the Method of Reflections Help Predict Future Growth? *Discussion Paper, Louvain-La-Neuve: Université Catholique de Louvain, Institut de Recherches Economiques et Sociales (IRES)*, *2013008*.

Poncet S, Starosta de Waldemar F. (2013). Complesite Economique et Croissance. *Revue Economique*, *3*(64), 495–503.

Stojkoski V, Kocarev L. (2017). The Relationship Between Growth and Economic Complexity: Evidence from Southeastern and Central Europe. *Munich Personal RePEc Archive, MPRA Paper*, *7783*.

Utkovski Z, Pradier MF, Stojkoski V, Perez-Cruz F, Kocarev L. (2018). Economic Complexity Unfolded: Interpretable Model for the Productive Structure of Economies. *PLoS ONE*, *13*(8), e0200822.

Yildirim M. (2014). Diversifying Growth in Light of Economic Complexity. *Brookings Bloom Roundtable Session VI Where Can Enclave Projects Take Us?: Brookings Institutions*.

Zhu S, Li R. (2016). Economic Complexity, Human Capital and Economic Growth: Empirical Research Based on Cross-country Panel Data. *Applied Economics*, *49*(38), 3828.

## APPENDIX

**Appendix 1.** List of Developing Country

| Middle Income Countries | | | Low Income Countries |
|---|---|---|---|
| Albania | Kazakhstan | Ukraine | Burkina Faso |
| Algeria | Kenya | Uzbekistan | Democratic Republic of Congo |
| Angola | Kyrgyzstan | Vietnam | Ethiopia |
| Argentina | Laos | Zambia | Guinea |
| Armenia | Lebanon | Zimbabwe | Liberia |
| Azerbaijan | Malaysia | | Madagascar |
| Bangladesh | Mauritania | | Malawi |
| Belarus | Mauritius | | Mali |
| Bolivia | Mexico | | Mozambique |
| Bosnia and Herzegovina | Moldova | | Togo |
| Botswana | Mongolia | | Uganda |
| Brazil | Morocco | | |
| Bulgaria | Myanmar | | |
| Cambodia | Namibia | | |
| Cameroon | Nicaragua | | |
| China | Nigeria | | |
| Colombia | North Macedonia | | |
| Costa Rica | Pakistan | | |
| Cote d'Ivoire | Panama | | |
| Cuba | Papua New Guinea | | |
| Dominican Republic | Paraguay | | |
| Ecuador | Peru | | |
| Egypt | Philippines | | |
| El Savador | Republic od Congo | | |
| Eswatini | Romania | | |
| Gabon | Russia | | |
| Georgia | Senegal | | |
| Ghana | Serbia | | |
| Guatemala | South Africa | | |
| Honduras | Sri Lanka | | |
| India | Tajikistan | | |
| Indonesia | Tanzania | | |
| Iran | Thailand | | |
| Jamaica | Tunisia | | |
| Jordan | Turkey | | |