

Elasticity of Formal and Informal Labor on Regional Economic Growth: The Moderating Role of Fiscal Independence in the Era of Gig Economy in Indonesia

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Abstract

The emergence of gig economy has transformed the pattern of informal employment in developing countries, including Indonesia. Ride-hailing marketplaces, delivery service apps and on-demand work platforms have grown the informal labor sector into an increasingly crucial component of regional economic life. It then becomes useful to explore how informal gig as well as the traditional labor force are economically productive, in a context of regional tax autonomy. This study: its objectives are to analyze elasticities of both formal and informal labor on GRDP and to explore the moderating role of fiscal independence. In a System GMM for dynamic panel data, the findings suggest that informal labor is more elastic to GRDP than formal labor. This responsiveness can be attributed to the elasticity of informal employment, low entry barriers and its close association with local consumption areas. Moreover, upon being moderated by fiscal independence, it was found that fiscally independent regions showed higher elasticity of informal labor. This reflects that fiscally independent regions rely on the traditional and gig economy informal activities micro enterprises, services, platform work, more than those with comprising local demand and fiscal capacity. These results generalize the theory of dual labor market and Lewis's surplus labor model by adding the gig economy as a contemporary version of informal sector. Policy implications emphasize that regional fiscal strategies should not only aim to strengthen local revenue capacity but also actively support and regulate the gig economy and informal sector as inclusive drivers of regional economic growth.

Keywords: Gig Economy, Labor Elasticity, Formal and Informal Labor, Fiscal Independence, SYS-GMM

1. Introduction

Changes in the structure of the global labor market over the past decade have been driven by digitalization and the emergence of work platforms, a phenomenon often referred to as the gig economy. Work-based platforms have not only expanded the forms of temporary work; in many developing countries, these platforms have changed patterns of economic participation by absorbing workers who were previously engaged in traditional informal activities. A recent literature review highlights how digital platforms blur the boundaries between formal and informal work, while posing new challenges related to job quality and the measurement of economic contributions (Pilatti et al., 2024).

In the context of developing countries such as Indonesia, the expansion of digital platforms (online transportation, delivery services, marketplaces) has broadened the base of platform-based informal work. Empirical research shows that gig workers face a combination of flexibility and vulnerability. This flexibility allows for a quick response to local demand, but also leaves them vulnerable to income variability and a lack of social protection (Heeks et al., 2021).

Classical development theories such as Lewis' Dual Sector Model assume that the traditional sector (informal/agricultural) contains surplus labor with very low marginal productivity, while the modern sector (formal/industrial) is the source of productivity and growth. However, contemporary evidence shows that modern informality, including the gig economy, has adaptive and productive characteristics that are not entirely consistent with Lewis' traditional assumptions, thus requiring conceptual revision (Sultana et al., 2022).

From a macro perspective, the relationship between informal employment and economic growth can be bidirectional: the informal sector can support domestic demand and absorb labor when the formal sector is stagnant, while regional output growth also drives informal employment absorption. Empirical panel studies recommend caution when interpreting the contribution of the informal sector to GRDP due to heterogeneity between countries or regions (Sultana et al., 2022).

Regional fiscal independence is reflected in the capacity of Local Own-Source Revenue (PAD) to influence the ability of local governments to build infrastructure, digitization, and support programs for MSMEs or even informal workers. Cross-national and sub-national studies have found that the effects of fiscal decentralization on growth are not uniform; the impact depends on the quality of local institutions, expenditure allocation, and fiscal capacity itself (Canavire-Bacarreza, Martinez-Vazquez, & Yedgenov, 2020).

In modern empirical analysis, the use of dynamic estimators such as System GMM is recommended to address endogeneity and feedback between labor and regional output variables. This technique allows for the estimation of labor elasticity to output by taking into account lag dynamics, fiscal policy endogeneity, and regional fixed factors.

Sub-national research shows heterogeneity in results: some regions with large PAD use fiscal capacity to strengthen local markets (road infrastructure, digital markets, skills training), which in turn facilitates the growth of the productive informal sector—e.g., micro-trading and platform-based services—thereby increasing the elasticity of informal labor to GRDP in these regions (Canavire-Bacarreza et al., 2020).

Based on this synthesis of theory and empirical evidence, it is important to empirically re-evaluate the Lewis model in the era of the gig economy and fiscal decentralization: modern informal workers are not always merely unproductive surpluses; if regions have fiscal capacity and supportive policies, informal/gig workers can become an elastic engine of regional growth. Therefore, studies comparing the elasticity of formal and informal workers and testing the moderation of fiscal autonomy (using SYS-GMM on regional panel data) offer relevant theoretical and policy contributions.

2. Research method

The data used in this study is panel data, which is a combination of time series and cross-sectional data. The time series data used is annual data from 2013-2019 and cross-sectional data is 33 provinces in Indonesia. This study uses data obtained from the Central Statistics Agency (BPS) for each province, the Board of Audit Republic of Indonesia (BPK) related to Fiscal Independence Index data and the Directorate General of Fiscal Balance (DJPK) related to APBD realization and of course the variables of formal and informal workers as main variables. Endogenous variables in this study are economic growth.

$$\begin{aligned} \ln PDRB_{kapit} = & \alpha_0 + \alpha_1 \ln PDRB_{kapit-1} + \alpha_2 \ln BP_{it} + \alpha_3 \ln BB_{it} + \alpha_4 APMSMA_{it} + \\ & \alpha_5 \ln FORM_{it} + \alpha_6 \ln INFORM_{it} + \alpha_7 \ln INFORM_DFM + u_{it} \end{aligned} \quad (1)$$

Where $\ln PDRB_{Kap}$ is the dependent variable, $\ln INFORM$ and $\ln FORM$ is the main independent variable, other variables just as control variables. On the other hand, a is a constant (intercept), b is the coefficient of the variable X (coefficient of determination), and u is an error. Equation (1) is system dynamic panel-data estimation. This study used descriptive analysis and quantitative analysis approaches. The quantitative analysis used is in the form of dynamic panel data simultaneous equations. Some economic variables are dynamic, meaning that the value of a variable is influenced by the variable itself but is closely related to the past or the previous period. Therefore, a dynamic panel data model is needed.

One method used to measure fiscal independence is the Fiscal Independence Index (IKF) developed by Hunter (1977). However, there is a shortcoming of the index that is built, namely that the index value will be negative if non-PAD (DAU + DAK + Regional Loans + DBH) exceed total expenditures (Board of Audit, 2019). Thus, the Board of Audit tries to reformulate so that the calculation of the Fiscal Independence Index by Hunter (1977) can be adjusted to the structure of the APBD in Indonesia. While there is an author's development because DBH is a source of income that has been generated by a region. So it needs to be included in the calculation.

$$IKF = 1 - \frac{TrGP + TrSP + PjD}{PAD + TrGP + TrSP + PjD + DBH}, \text{ With DBH} \quad (2)$$

$$IKF = 1 - \frac{TrGP + TrSP + PjD + DBH}{PAD + TrGP + TrSP + PjD + DBH}, \text{ Without DBH} \quad (3)$$

Description

$PDRB_{kapit}$	= Gross Regional Domestic Bruto per capita in province i at year t
$\ln INFORM_DFM_{it}$	= Interaction between Formal Workers with fiscally independent province
BP_{it}	= All of Employee Expenditure in province i at year t
BB_{it}	= All of Goods Expenditure in province i at year t
$APMSma_{it}$	= Pure Participation Rate Senior High School in province i at year t
$FORM_{it}$	= Number of Formal Worker in province i at year t
$INFORM_{it}$	= Number of Informal Worker in province i at year t
α_0	= Intercept

α_n	= Regression Coefficient
u_{it}	= Error Term
IKF	= Fiscal Independence Index
PAD	= Regional Original Revenue
TrGP	= General Purpose Transfer
TrSP	= Special Purpose Transfer
PjD	= Subnational Borrowing
DBH	= Revenue Sharing Fund

3. Results and Discussion

3.1. Descriptive Analysis

There are differences in the condition of fiscal independence. DKI Jakarta Province from 2013 to 2019, through the calculation of the Supreme Audit Agency, was categorized as very fiscally independent. This condition was only recorded in 2015, then until 2019 DKI Jakarta Province was no longer categorized as very independent. Three provinces with DBH adjustments were categorized as very independent in 2013 but continued to decline until 2019 only one province was categorized as very independent, namely DKI Jakarta Province. The condition of fiscal independence has shifted from the old calculation to the new calculation which is then reflected in Figure 2.

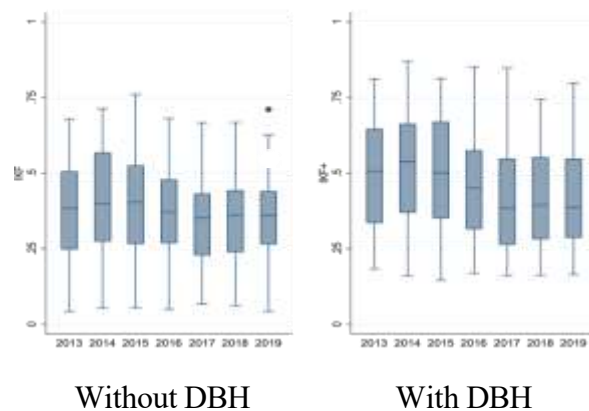


Figure 1. Boxplot of Indonesia's Fiscal Independence Index in 2019
Source: DJPK (2019), processed

Referring to the spending characteristics of each province according to fiscal independence. The more fiscally independent a region is, the higher its expenditure allocation. This can occur considering that independent regions have high additional revenue through PAD and DBH, so that the allocation of expenditure is much greater than in regions that are not fiscally independent. More clearly depicted in Figure 2.

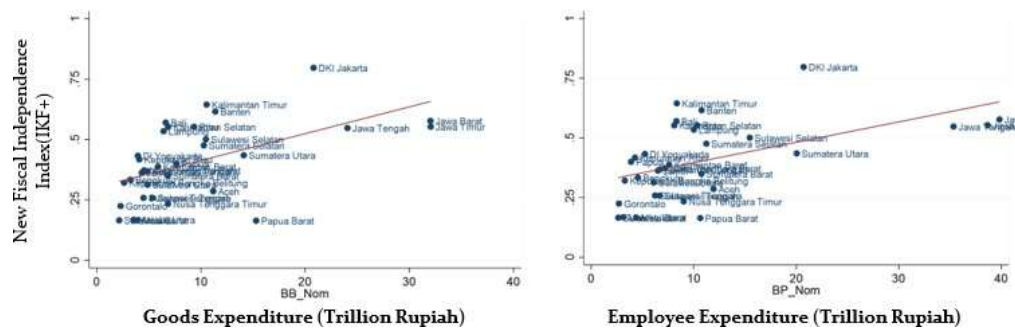


Figure 2. the relationship between expenditure characteristics and fiscal independence

Source: DJPK (2019), processed

In addition, when linking the percentage of formal and informal workers with fiscal independence, the graph shows that there is a direct correlation between the fiscal independence index and formal workers, meaning that regions that are more fiscally independent tend to have a higher percentage of informal workers, and vice versa. This can be seen more clearly in Figure 3 and 4.

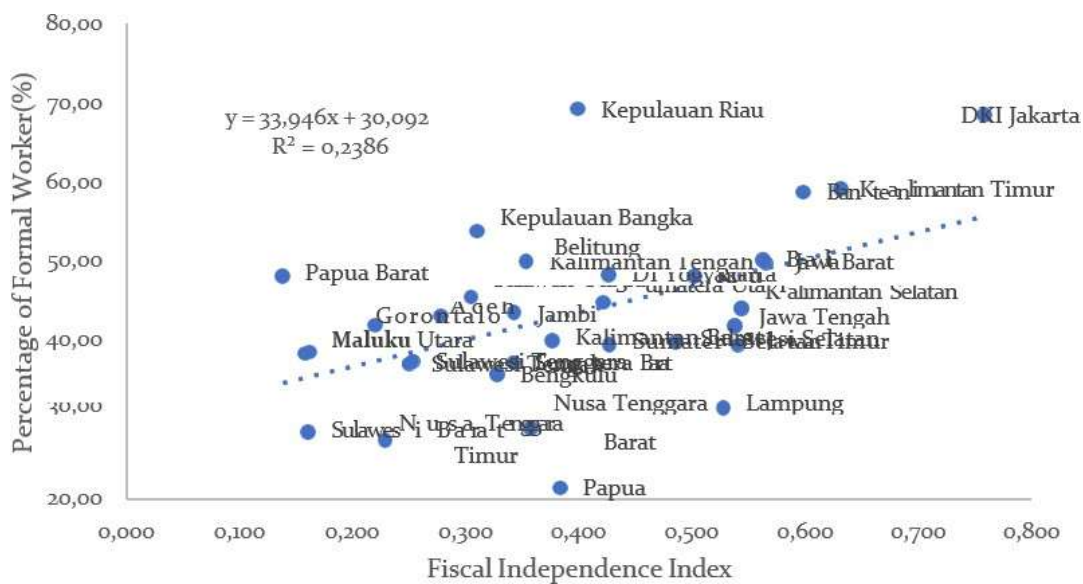


Figure 3. the relationship between formal worker and fiscal independence

Source: BPK, BPS (2019), processed

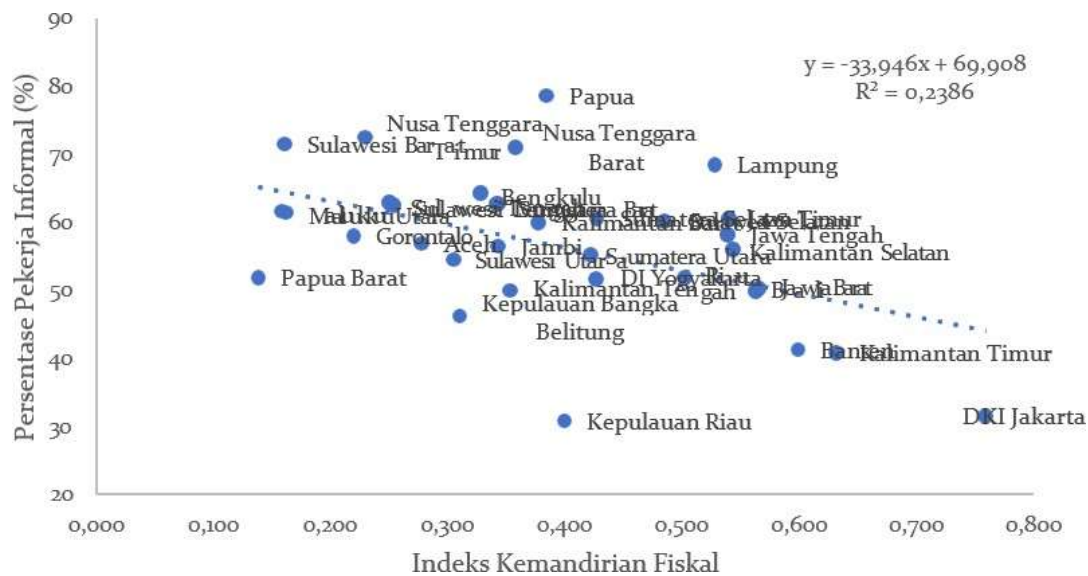


Figure 4. the relationship between informal worker and fiscal independence

Source: BPK, BPS (2019), processed

When a region has greater fiscal autonomy measured by its ability to increase its own-source revenue (PAD), revenue sharing fund (DBH), and allocate local spending independently, local governments tend to have greater capacity to finance infrastructure, public services, and business development. Such interventions increase incentives for micro and small businesses to formalize (access to formal markets, financing, and public services), thereby increasing the percentage of formal workers and decreasing dependence on informal employment.

Empirical evidence on fiscal decentralization studies shows that effective fiscal autonomy enables resource allocation that is more suited to local needs, thereby promoting structural economic transformation (Canavire-Bacarreza, 2020). Furthermore, experiments and policy studies on formalization efforts show that administrative support and access to financial services (which are more likely to be provided by local governments with good fiscal capacity) increase the likelihood of informal firms/workers transitioning to formal status, increasing formal absorption without resorting to counterproductive coercive taxation approaches (Campos, et al., 2023). Thus, fiscal independence accompanied by appropriate development policies is positively associated with an increase in the share of formal workers and, conversely, a decrease in the proportion of informal workers.

3.2. Quantitative Analysis

Through descriptive analysis, it can be seen that there is a positive relationship between formal workers and regions that are classified as fiscally independent, as well as non-formal workers who have a negative relationship with the fiscal independence of a region. Nevertheless, this analysis does not yet address the extent to which formal and informal workers influence regional economic growth.

The results show that, in the short run, the elasticity of informal workers to increases in GRDP or economic growth is greater than that of formal workers even in the long run. For every 1% increase in informal workers, GRDP increases by up to 0.04%, while the elasticity value for formal workers is only 0.03%. Empirical evidence from developing countries using dynamic panels also shows that the

informal sector is not merely a remnant of the economy; in conditions of strong local demand and appropriate policy support, informality can be a source of sustainable growth. This finding supports the hypothesis that the elasticity of informal labor to GRDP may be higher in certain regions (Sultana et al., 2022).

Another interesting result found in the study is that informal workers in fiscally independent regions continues to have a positive and significant influence on GRDP per capita. Every 1% increase in informal workers for fiscally independent regions results in an increase in GRDP per capita of 0.0392%, while every 1% increase in informal workers in regions that are not fiscally independent results in an increase in GRDP per capita of only 0.0378%, more clearly can be seen in the Table 1.

In addition, there is a control variable that also has a significant effect on economic growth, namely the pure participation rate of senior high school (APM) graduates. The high school APM has a significant positive effect on GRDP in both the long and short term. The high school net enrollment rate even contributes more in the long term than in the short term. APM Rate of senior high school has a high elasticity value compared to several other factors. This means that education is an important factor in increasing the output of a region. Meanwhile, the existence of an educated society can strengthen a country in improving workers' skills, which can then increase productivity (Khusaini, 2018). Human capital foundations such as economics, education and health can boost the economic productivity of each individual. Countries with higher quality human capital are able to achieve higher long-term growth (Zhu and Li, 2006).

Next, there are variables for goods expenditure and employee expenditure. Spending on goods has a positive and significant effect on per capita GRDP in both the long and short term. The estimation results reinforce Keynes' theory and are also in line with research conducted by Azwar (2016) that spending on materials or goods can have a positive impact on the economy. Employee expenditure is distributed in the form of salaries, honoraria, wages, and other expenditures that can stimulate consumption spending. Thus, an increase in employee spending can stimulate household consumption, which in turn can have an impact on regional economic growth. Research conducted by Bose et al. (2007) also concluded that there is a positive relationship between public spending and household consumption and economic growth.

At the micro level, the gig economy literature documents how platforms enable rapid adjustments between the supply and demand for local services: drivers/courier partners can increase their working hours when demand rises, so that local service output grows relatively quickly. This supply-responsive mechanism explains why platform-based informal workers can demonstrate higher elasticity to changes in GRP than formal workers tied to long-term contracts (Pilatti et al., 2024).

The integration of empirical evidence on the informal sector and evidence on platform work shows that in fiscally autonomous regions, local policy support (e.g., digital training, access to microfinance, market regulation) can amplify the local multiplier of informal/gig economy activities. In other words, fiscal autonomy can positively moderate the relationship between informal labor and GRP if fiscal allocations are directed toward productive investments (Canavire-Bacarreza et al., 2020).

Table 1. Estimated results of the Regional Gross Domestic Product (RGDP) per capita model using the SYS-GMM method

Model Ln_PDRB per kapita - SYS GMM		
Variable	<i>Estimated Coefficients</i>	
	Short Run	Long Run
LnPDRBkapt-1	0,8438**	-
	*	
APMsma	0,0136**	0,0868***
	*	
LnBP	0,0137**	0,0877**
LnBB	0,0065**	0,0415**
LnInform	0,0378**	0,2410***
	*	
LnForm	0,0298**	0,1909***
	*	
LnInForm_DFM	0,0014**	0,0089***
	*	
<i>Constanta</i>	-0,1553	-
<i>AB Test</i>		
AR (1)		0,0706
AR (2)		0,8830
<i>Sargan Test</i>		
<i>P-Value</i>		0,0694

Source: Processed

DFM = 1 is a fiscally independent province and DFM = 0 is a province that is not fiscally independent. ***, **, * denote significance at the 1, 5, and 10% level respectively.

Cross-country studies examining the relationship between fiscal decentralization and growth note that empirical results depend on identification instruments and strategies due to reverse causality: more prosperous regions/countries tend to be more fiscally independent. Therefore, moderation analysis of fiscal autonomy must address potential endogeneity so as not to misinterpret causal relationships (Canavire-Bacarreza et al., 2020).

On the platform labor policy side, management and organizational literature emphasizes the role of algorithmic management in regulating gig work: algorithms influence task allocation, flexibility in the form of control, and wage implications. This affects how gig workers respond to changes in

demand, which is an important aspect when linking the gig economy to regional output elasticity (Kadolkar et al., 2024).

Uniquely, this research attempts to challenge a long-established theory in the field of labor. That theory is the Lewis turning point model. Lewis' model explains that Economic growth in developing countries is driven by labor transfer from traditional sectors (informal, low productivity) to modern sectors (formal, high productivity). In the classical model Informal labor is considered surplus and its contribution to GRDP is small, while the formal sector is considered the main engine of growth.

However, the results of the study do not fully follow this pattern. Instead, they show that informal workers are more elastic to economic growth than formal workers, especially in regions with high fiscal independence. The classic Lewis model no longer fully applies in the modern economy, especially with the emergence of the gig economy and the digitization of informal work. Informal work today is not always synonymous with low productivity. For example, online motorcycle drivers, digital freelancers, and online merchants can respond very quickly to regional economic growth.

In fiscally independent regions, local governments are better able to create digital economic infrastructure, support micro-entrepreneurship, and provide room for expansion for the informal/gig economy sector. As a result, the informal sector in these regions is more flexible and adaptive to GRDP growth than the more bureaucratic formal sector. There are several comparisons between Lewis's theory and the research results.

Table 2. Comparison between classic Lewis Model and The Findings

Aspect	Classic Lewis Model	Findings
Labor structure	Dualistic: formal (modern) vs informal (traditional)	Still dualistic, but informal has grown (gig economy)
Source of growth	Formal sector (modern industry)	The informal sector is adaptive to GRDP
Labor surplus	Informal unproductive surplus	= Informal = flexible, newly productive
Turning point	When the labor surplus runs out → rise	Can appear more quickly in fiscally autonomous regions due to increased efficiency and productivity

Source : Processed

4. Conclusion and Recommendations

The results of the study show that the elasticity of informal labor to regional economic growth is higher than that of formal labor, and this difference is even more pronounced in regions with high fiscal autonomy. This condition indicates that when regions have strong fiscal capacity—through Local Own-Source Revenue (PAD) and Revenue Sharing Funds (DBH) and more autonomous spending policies—informal economic activities, including the gig economy, can develop more dynamically and productively. Local governments with adequate fiscal resources are able to create an economic climate conducive to the growth of micro, small, and independent businesses through infrastructure development, digital support, and local economic empowerment policies. Thus, the positive relationship between fiscal autonomy and the elasticity of informal labor illustrates the ability of local fiscal capacity to act as a catalyst for growth based on labor flexibility.

This finding can be linked to W. Arthur Lewis's (1954) two-sector theory, which explains the shift of labor from the traditional sector to the modern sector as the economy grows. However, in the context of modern Indonesia and the digital economy, this dynamic has undergone a structural reinterpretation. Regions that are more fiscally independent show that the informal sector is not merely a repository for surplus labor, but has evolved into a productive sector that is responsive to economic change. Fiscal autonomy enables regions to design policies that are more suited to local characteristics, strengthen innovation capacity, and accelerate the process of structural transformation. This reinforces the view that effective fiscal decentralization can be a means of accelerating labor mobility and expanding the local economic base.

Based on these results, several policy recommendations can be proposed. First, the central government needs to expand regional fiscal space through increased performance-based transfers and progressive expansion of local revenue sources, and of course optimize the use of revenue sharing funds so that regions have strong incentives to develop the informal sector towards more productive activities. Second, local governments with high fiscal capacity need to direct their public spending towards inclusive formalization programs, such as digital entrepreneurship training, simplification of micro business permits, and integration of social protection for gig economy workers. Third, a framework for cross-regional fiscal and labor coordination needs to be developed so that differences in fiscal capacity do not cause labor elasticity gaps between regions. With this combination, fiscal independence will not only be an indicator of regional finances, but also a strategic instrument for transforming the informal sector into a driver of sustainable regional economic growth.

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References

- [Board of Audit Republic Indonesia]. (2019). Review Report on Fiscal Independence of Local Government for Fiscal Year 2018 and 2019. Jakarta.
- Bose N, Hague ME and Osborn DR. 2007. Public Expenditure and Economic Growth; A Disaggregated Analysis for Developing Countries. The Manchester School, 75-85, 533-556. Boston: McGraw Hill Inc.
- [BPS] Badan Pusat Statistik. 2024. Neraca Ekonomi. Jakarta, 2019. Realisasi Penerimaan Pemerintah Provinsi Seluruh Indonesia menurut Jenis Penerimaan 2005-2019. Jakarta
- Canavire-Bacarreza, G., Martinez-Vazquez, J., & Yedgenov, B. (2020). Identifying and disentangling the impact of fiscal decentralization on economic growth. *World Development*, 127, 104742. <https://doi.org/10.1016/j.worlddev.2019.104742>.
- Campos, F., Goldstein, M., & McKenzie, D. (2023). How should the government bring small firms into the formal system? Experimental evidence from Malawi. *Journal of Development Economics*, 161, 103045. <https://doi.org/10.1016/j.jdeveco.2022.103045>.
- Cruz, S. A., Ramirez, & colleagues. (2023). Understanding platforms, workers, clients in a service relation. *Frontiers in Sociology*. <https://doi.org/10.3389/fsoc.2022.1075808>.
- Heeks, R., Graham, M., Mungai, P., Van Belle, J.-P., & Woodcock, J. (2021). Systematic evaluation of gig work against decent work standards: The development and application of the Fairwork framework. *The Information Society*, 37(5), 267–286. <https://doi.org/10.1080/01972243.2021.1942356>.
- Hunter, J.S.H. (1977). *Federalism and fiscal balance: a comparative study*. Australian National University Press for Research on Federal Fiscal Relations. ISBN 10: 0708113370
- James, A. (2024). Platform work-lives in the gig economy: Recentering work–family research. *Gender, Work & Organization*, 31(2), 513–534. <https://doi.org/10.1111/gwao.13087>.
- Kadolkar, I., Kepes, S., & Subramony, M. (2024). Algorithmic management in the gig economy: A systematic review and research integration. *Journal of Organizational Behavior*. <https://doi.org/10.1002/job.2831>.
- [Kementerian Keuangan-DJPK]. 2016. Laporan Tahunan 2016. Jakarta.
- Lewis, W. A. (1954). “Economic Development with Unlimited Supplies of Labour.” *The Manchester School*, 22(2), 139–191.

- Khusaini. (2018). Study of Strategies to Increase the Pure Participation Rate (APM) at the Secondary Education Level in Banten Province. Banten. Agency Research and Development of the Regional Development Planning Agency of the Banten Provincial Government. pp 4-5.
- Misra, A. K., & colleagues. (2024). Role of informal sector to combat unemployment in developing countries. *Heliyon*. <https://doi.org/10.1016/j.heliyon.2024.e33378>.
- Pilatti, G. R., Pinheiro, F. L., & Montini, A. A. (2024). Systematic literature review on gig economy: Power dynamics, worker autonomy, and the role of social networks. *Administrative Sciences*, 14(10), 267. <https://doi.org/10.3390/admsci14100267>.
- Sultana, N., Rahman, M. M., & Khanam, R. (2022). Informal sector employment and economic growth: Evidence from developing countries in SDG perspective. *Sustainability*, 14(19), 11989. <https://doi.org/10.3390/su141911989>.
- Widodo, T. (2006). The Role of Informal Sector in Regional Economy: Delphi-IO Approach and Application. *Journal of Economics and Business*. 21(3): ISSN 0215-2487.
- Zhu, S., Li, R. (2016). Economic Complexity, Human Capital and Economic Growth: Empirical Research Based on Cross-country Panel Data. *Applied Economics*. 49(38):3815-3828.