

Convergence in regional wage: new evidence from Indonesian provinces

Muhamad Rifki Maulana*, Harry Aginta**

* Bank of Indonesia, Jakarta - Indonesia. muhamad_rm@bi.go.id

** Bank of Indonesia, Jakarta - Indonesia and Nagoya University, Nagoya - Japan harry_ag@bi.go.id; aginta.harry@c.mbox.nagoya-u.ac.jp

Abstract

We empirically evaluate convergence in wage across 34 Indonesian provinces. We apply the club convergence test (Phillips & Sul, 2007, 2009) on the proxy of real wage data at province level from 2008-2020 and identify three significant club convergence in regional wage. Furthermore, using ordered logit model, we investigate some condition that influence the club convergence formation. We find that the following variables influence club convergence formation: initial level of wage, share of employment on manufacturing sector, investment share to GDP and labor force participation rate. Our findings support the evidence of club convergence studies that emphasize the role of initial condition and regional characteristics on the formation of club convergence. From a policy standpoint, our results should alert national and regional governments to synchronize policies on promoting sound and competitive labor market across provinces.

Keywords: regional wage, club convergence, ordered logit model

1. Introduction

Modern economic theories predict that in a fully integrated labor market, workers with indistinguishable skills will earn equal payments (Hicks, 1963; Marshall, 1920). The notion of this equality in wage across homogenous workers is rooted in 'the law of one price (LOOP)'. According to LOOP, identical asset or commodity in one particular place would have the same price elsewhere, when certain factors are controlled. Numerous studies have frequently used the LOOP as the theoretical basis for the analyses, in particular the convergence in commodity prices (Federico, 2012). Considering labor as a factor of production, many studies have also referred LOOP as the ground for analyzing labor market (Galizia, 2015; Rosenbloom, 1998; Rosenbloom & Sundstrom, 2002).

In Indonesia, topic about wage convergence or income disparity is very relevance because it often becomes the main factor for many people do the migration which increased in the last few years. Based on theory, economy is one aspect that could influence migration and several theories that underlie this among them were delivered by Mantra (1992) and Todaro & Smith, (2003). Both agree that economic motives are one's reasons do the migration, especially migration from rural to urban areas. Work as a sources of economic livelihoods become a push factor if there is no work with feasible wages available in origin area. Indonesian Central Bureau of Statistics recorded that the percentage of population in urban areas on 2020 is 56.7% increase from 2010 which only 49.8%. Furthermore, that percentage projected to increase up to 66.6% in 2035, due to massive development in urban area which requires a lot of workers. Another study from Indonesian Central Bureau of Statistics shows that the number of lifetime migrants on 2019 in Indonesia is up to 29.8 million people with migrant workers of 5.4 million people. Java Island dominates the population of migrants in Indonesia, with around 51.2% of lifetime migrants and 56.5% of migrant workers residing in Java Island. The high number of migrants in Java is mainly influenced by wage condition, living cost, and the availability of living facilities. Other than that, depth analysis about wage convergence is supposed to be an answer from the high number of Gini ratio in Indonesia.

This paper focuses on convergence patterns of the long-run dynamics in wages across Indonesian provinces and the influencing factors of the converging behavior. Despite numerous studies on regional income convergence, little is known about regional wage convergence in Indonesia. Furthermore, in this paper we use average net income per month of employee and

laborer in 34 provinces from 2005-2020 as main indicator instead of regional minimum wage (Upah Minimum regional - UMR). In many cases, regional minimum wage usually influenced by local government policy and other unconditional factors, so it does not optimally represent the real market situation. We also remove the effect of inflation on regional wage by converting the data from nominal into real term using provincial Consumer Price Index (CPI) of 2005 as the base.

By applying club convergence technique (Phillips & Sul, 2007), we find three significant convergence clubs of regional wage. Interestingly, the composition of the clubs by using real wage is very similar to the one we obtained by using nominal wage, implying the existence of price-adjusted mechanism in regional wages. Provinces that converge into the higher wage clubs (club 1 and club 2) have similar characteristic where there are many national strategic projects are being built and have high traffic of migrant workers. Our further analysis using ordered logit model suggests that the formation of club convergence is significantly explained by the following variables: initial level of wage, share of employment on manufacturing sector, investment share to GDP and labor force participation rate. Our findings reveal that investment and manufacturing share to GDP have significant role to determine the club formation. These findings also confirm the assumption of similar characteristics from those are as mentioned above.

The remaining part of the paper is organized as follows. Section 2 reviews related literature and in Section 3 discusses the methodologies and data. We discuss the results of club convergence identification and the influencing factors in Section 4. Finally, Section 5 concludes the paper.

2. Brief review on wage convergence studies and contribution of present paper

Within the scope of analysis in labor market, LOOP implies wage convergence across workers and locations since the advancements in transportations and communication technologies increase labor mobility (Prado et al., 2020). Indeed, a collection of studies show evidence of regional wages convergence since pre-industrial times. The main mechanism of convergence in wage lies on the heart of LOOP, where regional wage differentials tend to decrease when there is no migration barriers, in particular migration from low-wage regions to high-wage regions (Collin et al., 2019). However, as has been shown in other empirical studies, this mechanism assumes that there is a significant advancement in transportation and communications that can enlarge the scope of labor market across geographical boundaries.

With these theory and empirical backgrounds, it is natural to expect an interesting finding from the analysis on regional wage convergence in Indonesia due to the vast transportation and communications infrastructure development in the last decade. One of proofs rapid development of transportation infrastructure in Indonesia was shown by the number of airports in Indonesia which increase from 148 unit in 2004 to 235 unit in 2018. As a result, the traffic of domestic passengers was skyrocketing during that period from 34 million passengers per year in 2004 to 94 million passengers per year in 2018. Similarly, there has been also a rapid development in communication infrastructure due to massive base transceiver station (BTS) construction which built by Indonesia's telecommunication state-owned enterprise from only around 26 thousand unit in 2008 to 231 thousand in 2020.

The present paper contributes to the existing literature by focusing on wage convergence analysis across regions that can be used to evaluate the degree of labor market integration in Indonesia. Previously, there are several studies examine convergence in Indonesia but mainly focused in GDP per capita and total GDP in each province. For example, applying dynamic panel data approach, Firdaus & Yusop (2009) analyze convergence in income using province level data of Indonesia. With system GMM estimation, they provide evidence of convergence among Indonesian provinces during 1983 – 2003 period. However, the speed of convergence is relatively very slow (0.29%), much lower than the convergence speed observed in most of regional convergence studies: 2% (Barro et al., 1991; Barro & Xavier Sala-i-Martin, 1992). Using classical absolute and conditional convergence frameworks, Kharisma & Saleh (2013) analyze income convergence among 26 provinces in Indonesia during 1984-2008. They find a strong indication of the existence of absolute convergence and conditional convergence and refer this evidence as the catching-up process where provinces with lower level of income in 1984 tend to grow faster relative to the provinces with higher level of income. Based on the system GMM estimation, they also find that the speed of convergence in Java is faster than those outside Java. The other study has been implemented by Vidyattama (2006) using longer data set since 1970's. Evidence from his studies show that significant changes in specific policies and economic development in Indonesia, including macroeconomic conditions and structural change, affect the pattern of regional income convergence. Finally, using the most recent data available, Aginta et al. (2020) analyze income convergence across 514 Indonesian districts from 2000-2017 using club convergence framework. Their findings support the lack of convergence in per capita income during post-decentralization era. Probably the closest study to our paper is the analysis by Aginta

(2021), where he identifies club convergence in regional price across provinces in Indonesia and further investigates the conditioning factors influencing the club formation. Using CPI data during 2012:01 to 2019:12 aggregated at province level, he shows the absence of overall convergence in the level of regional prices. Instead, the dynamic of regional prices is characterized by four club convergence. Using ordered logit model, his extended analysis shows that one unit change in labor productivity, inflation expectation, consumption growth, and spatial externalities significantly affect the probability of provinces clustered into a unique club.

We have shown that empirical research on wage convergence in Indonesia is scant. The present article attempts to close the research gap by bringing new evidence of regional wage convergence and its influencing factors.

3. Methods and data

3.1. Econometric methods

3.1.1. Testing for club convergence

Without necessity to have co-integration in time series, the log t convergence test developed by Phillips & Sul (2007) is able to investigate the existence of multiple convergence clubs (Bartkowska & Riedl, 2012). In other words, although the evidence of co-integrated in time series is lack, it does not automatically disprove convergence. With this advantage, large number of researchers have applied the method in various convergence analyses on different focuses including income, productivity, financial development and other social economic indicators.

To identify the presence of club convergence on regional wage, in this study we apply the modern test of club convergence by Phillips and Sul (2007). According to the model, we consider a panel-data variable, for instance, y_{it} is expressed as:

$$y_{it} = \delta_{it}\mu_t \quad (1)$$

where i refers to individual unit 1, 2, ..., N across time $t = 1, 2, \dots, T$, y_{it} is the dependent variable, δ_{it} indicates individual unit and time-specific component or a time-varying idiosyncratic element. μ_t is not unit-specific and thus characterize the common pattern of y_{it} . The dynamics of the idiosyncratic element, δ_{it} , can be expressed as:

$$\delta_{it} = \delta_i + \frac{\sigma_i \xi_{it}}{\log(t)t^\alpha} \quad (2)$$

where δ_i is time-invariant individual specific effect, and ξ_{it} is unnecessarily influenced by time with mean 0 and variance 1 across individual units. Departing from equation 2, the null hypothesis states that convergence exists if all individual units collectively approach the common transition path, such that:

$$\lim_{t \rightarrow \infty} \delta_{it} = \delta_i \text{ and } \alpha \geq 0 \quad (3)$$

Intuitively, the alternative hypothesis is $H_A: \delta_i \neq \delta$ for all i and $\alpha \geq 0$. To evaluate the convergence over the long-run time horizon, a relative transition parameter of individual units, h_{it} , is formulated as follows:

$$h_{it} = \frac{y_{it}}{\frac{1}{N} \sum_{i=1}^N y_{it}} = \frac{\delta_{it}}{\frac{1}{N} \sum_{i=1}^N \delta_{it}} \quad (4)$$

Basically, h_{it} represents the distinctive behavior of individual unit i against cross-sectional average. In the state of convergence under equation 3, $\delta_{it} \rightarrow \delta_i$, then $h_{it} \rightarrow 1$. This also implies that the cross-sectional variance of h_{it} converges to 0 ($H_t \rightarrow 0$),

$$H_t = \frac{1}{N} \sum_{i=1}^N (h_{it} - 1)^2 \rightarrow 0, \quad t \rightarrow \infty \quad (5)$$

where $H_t = \sigma_t^2$.

To empirically investigate the presence of convergence, the null hypothesis is tested with log t regression model based on the variance ratio $\frac{H_1}{H_t}$:

$$\log \left(\frac{H_1}{H_t} \right) - 2 \log \{ \log(t) \} = a + b \log(t) + \epsilon_t \quad (6)$$

for $t = [rT], [rT] + 1, \dots, T$ with $r \in (0, 1)$

From the Monte Carlo simulation, Phillips & Sul (2007) argue that setting $r = 0.3$ is recommended. The null hypothesis is rejected when $t_b < -1.65$, and if that is the case, the next step is identifying relative convergence or club convergence.

3.1.2. Identifying club convergence

The method of Phillips and Sul (2009) is able to identify if different club convergence exist in sub-sample in the absence of overall convergence in full sample. Hence, after testing overall convergence using log t regression, we use the clustering algorithm of Phillips and Sul (2009) for club convergence identification. A brief summary of this clustering algorithm is in Appendix 1.¹

¹ See Phillips and Sul (2009) for further detailed discussion.

3.1.3. Investigating conditioning factors of club convergence

Literature proposes important discussion on the conditioning factors of club convergence from two different convergence perspectives. On one hand, the club convergence hypothesis emphasizes the importance of initial condition for the transition of an economy. On the other hand, the approach of conditional convergence argues that structural characteristics completely affect the long-run growth path, while the initial condition are exogenous (Von Lyncker & Thoennessen, 2017).

Although the club convergence method by Phillips & Sul (2007) clusters individual units according to their transition path estimates, it does not explain the factors that drive club formation as Azariadis & Drazen (1990) and Galor (1996) specify as club convergence hypothesis. To complete our analysis, we investigate the conditioning factors of club convergence formation. For this purpose, similar to Bartkowska and Riedl (2012), we apply ordered logit model. Based on theoretical considerations discussed previously, we test both initial condition and structural characteristics as the explanatory factors in the estimation.

In practice, we denote each club convergence as $c = 1, 2, \dots, C$, where c is in categorical form according to the number of club convergence identified. Since the method of Phillips & Sul (2007, 2009) rank the clubs according to the long-run trend of each individual in the respective club, we are allowed to arrange c as an ordinal variable. We assume that there is unobserved variable y_t^* that is related to the long-run wage dynamics of provinces that force provinces being clustered in a certain club. Thus, we can write the specification as

$$y_t^* = X_i\beta + \epsilon_t \quad (9)$$

where X_i is a vectors consists of potential explanatory variables for club convergence membership, with $i = 1, \dots, 34$, indicating the province, and ϵ_t have a logistic distribution. The model uses maximum likelihood (ML) estimator to compute the probabilities of observing values of c . Note that although one can assess the directional effect of explanatory variables towards club membership with the sign of β coefficients, the magnitude does not contain any economic information. Therefore, in addition to the directional information given by the sign of β coefficients, we further compute the marginal effects of a given unit change in each explanatory variable on predicted probability, holding other variables constant.

3.2. Data

As a proxy of regional wage, we use the average of net nominal income per month received by a general worker (in thousand rupiahs). The data is published by Indonesian Central Bureau of Statistics. According to BPS, the net nominal income per month is defined as remuneration received during last month in the form of money or goods received by a person who considered as own-account worker, casual employee in agriculture or casual employee in non-agriculture sector. The range of our observation is from January 2008 to December 2020. The original data is in nominal terms. We then deflate the data using provincial Consumer Price Index (CPI), 2005=100. The summary statistics of our data is provided in Appendix (Table A1).

4. Results and discussion

4.1. Regional wage disparities across Indonesian provinces

Before implementing the club convergence test, it is important to document the pattern of dispersion of wage across provinces over time. As reported in Fig 1, the regional wage dispersion decreased from 2008 to 2013 but increased significantly in 2014 and remained high thereafter. Overall, the regional wage dispersion ended up higher in the last period compared to the initial period.

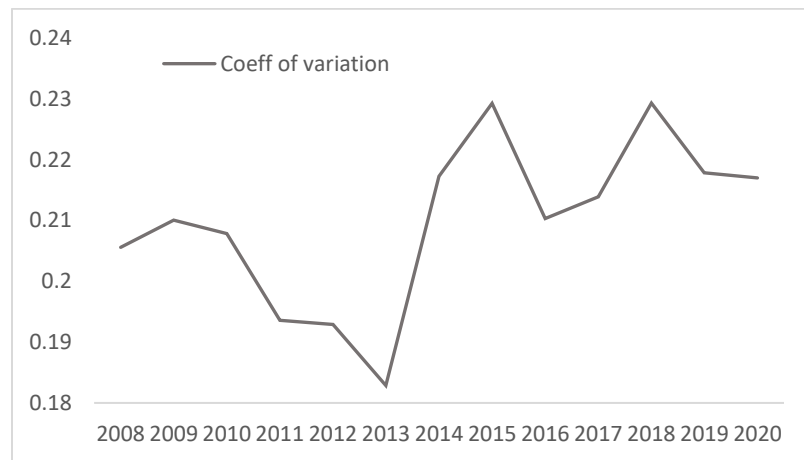


Fig. 1. Dispersion of provincial real wage, 2008-2020

We also illustrate the evolution of regional wage disparities among Indonesian provinces over the years. As seen from Fig 2, generally the quantiles of the distribution show persistent gaps over time, indicating the tendency of steady regional wage disparities, similar to what is shown

on Fig 1. In particular, the stable large gap between quantile 95 and the rest of quantiles and widening gap between quantile 75 and quantile 50 after 2017 implies a systematic difference between high-wage provinces and the rest of provinces that might be related to the structural differences. This dynamic of quantiles distribution in provincial wage helps us to understand that there is strong symptom of lack of convergence in regional wage across Indonesian provinces. However, this premature conclusion should be tested within formal econometric framework.

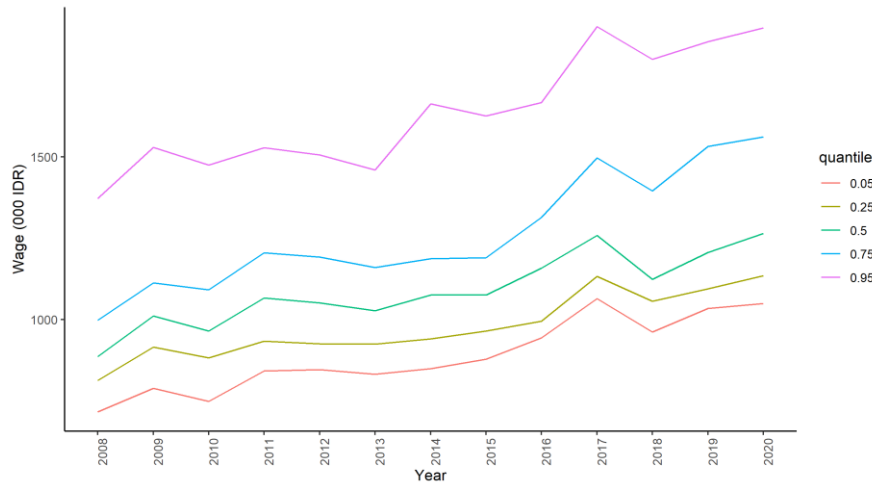


Fig. 2. Dispersion of provincial real wage, 2008-2020

4.2. Testing for convergence clubs

We begin the formal test of convergence by applying log t regression on real wage across 34 Indonesian provinces over the 2008:01 - 2020:12 period. As reported in Table 1, the results suggest to reject null hypothesis of overall convergence. Therefore, we can support our findings from preliminary inspection and conclude that Indonesian provinces did not converge to a common equilibrium in terms of real wage during the observation period. As real wage is partially linked to the price level in each province, this result is consistent with the evidence from previous studies where overall convergence is not observed in regional price dynamics across Indonesia prices (Jangam & Akram, 2019; Aginta 2021).

Table 1. Test of overall convergence

	Coefficient	Standard error	t-statistics
Log(t)	-1.130	0.014	-79.721

Note: t-statistic < -1.65 implies the rejection of null hypothesis of convergence.

We continue the analysis with the clustering algorithm by Phillips & Sul (2009) to identify club convergence. Table 2 presents the results.

Table 2. Club convergence test

	Club 1	Club 2	Club 3
Coefficient	0.113	0.745	-0.014
<i>t</i> -statistics	0.486	3.081	-0.126
Number of regions	3	9	22

Note: *t*-statistic < -1.65 implies the rejection of null hypothesis of convergence.

We find three significant initial clubs that represent the convergence dynamics of regional wage across Indonesian provinces.² Next, we use merging method of Phillips & Sul (2009) described in Appendix 2 to test whether the initial clubs can merge to their adjacent club and thus generate bigger club convergence. The results from merging test suggest to reject convergence hypothesis in any merging pair ($\hat{b} < 0$ and *t*-statistics < -1.65).³ Hence, we confirm the initial three clubs as the final club convergence. The clubs are ordered from the highest to the lowest wage; club 1 consists of provinces with higher wage while lowest wage provinces are clustered in club 3. As mentioned before, the club convergence method estimates the transition path of clubs as well as all individual units. Taking this advantage, in Fig 3 we show evolution of the computed clubs' transition paths over time. Unlike using absolute value of wage on Y axes (like in Fig 2), in Fig 3 we plot the relative value of each club to the cross-sectional average of all three clubs. Interestingly, there is indication of gap reduction between club 1 and club 2 from 2008 until 2012. However, the transition path of club 1 thereafter showed increasing trend with much higher slope compared that in club 2, creating wider gap between the two clubs. In other words, the pattern of expanding differences among the clubs' transition path supports the identification of significant club convergence over overall convergence. Instead of forming converging shape, reflected in smaller gaps between clubs over time, the three transition paths demonstrate increasing dispersion between clubs, where club 1 is systematically above the average, club 2 steadily move from below towards the average, while club 3 is consistently below the average.

² The evaluation of club convergence is executed using club convergence package in R developed by Sichera & Pizzuto (2019).

³ We also conduct merging procedure according to Von Lyncker & Thoennessen (2017). The test gives the identical results from merging test of Phillips & Sul (2009).

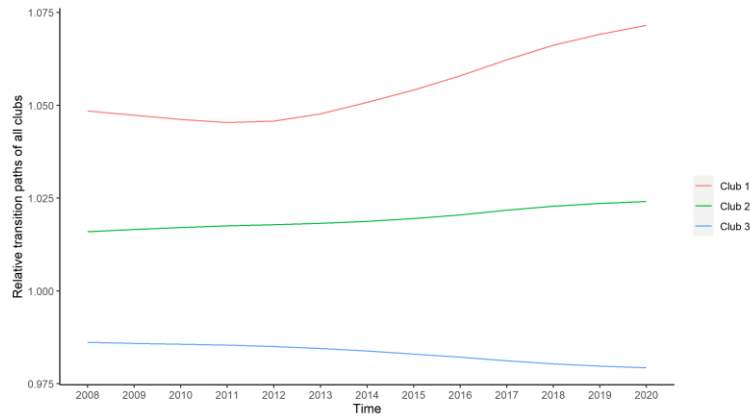


Fig. 3. The transition path of convergence clubs, 2008-2020

We then plot the transition path of provinces in each club in Fig 4. Unlike the diverging pattern shown in Fig 3, the transition path in Fig 4 (a), (b), and (c) clearly demonstrate convergence pattern, with smaller gap between provinces in the final period.

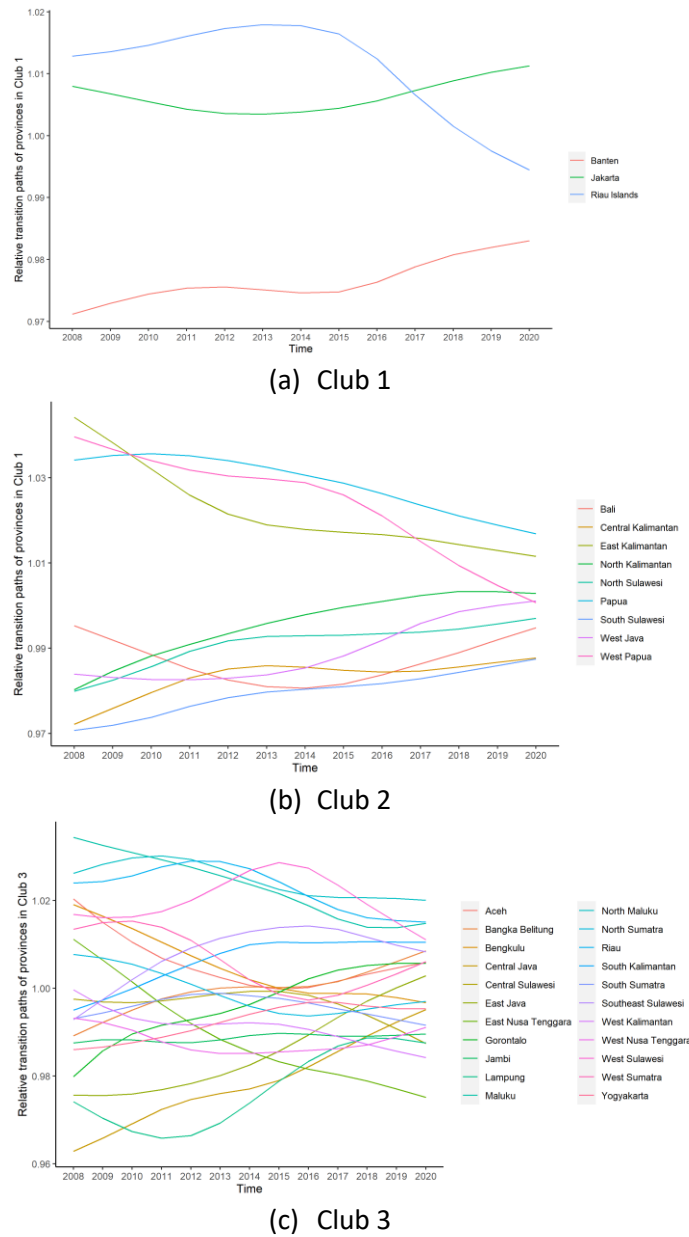


Fig. 4. The transition path of provinces within each convergence club, 2008-2020

Finally, we visualize the geographical distribution of club convergence in Fig 5. It is worth noting that we capture geographical effects of club convergence (Barro et al., 1991; Quah, 1996), similar to what has been documented in the study of Aginta et al. (2020) and Aginta (2021) when studying regional income and price convergence in Indonesia. These geographical effects are very clear in Sumatra island where a province and its neighboring provinces are clustered in the same club (club 3). The similar pattern is also observed in the distribution of club 2 (in Kalimantan and Papua island) and club 1 (where Jakarta and its neighbor Banten clustered together).

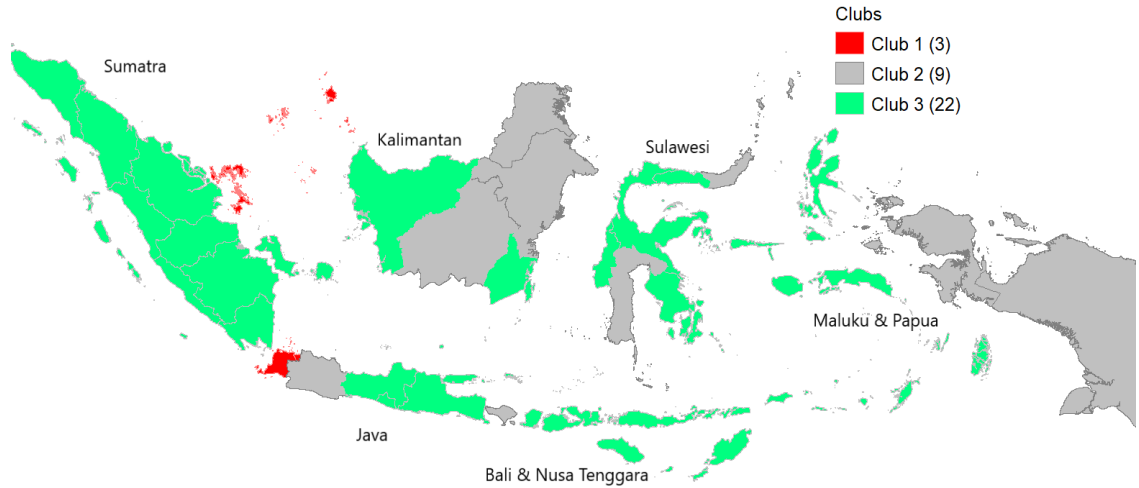


Fig. 5. The geographical distribution of club convergence

The club convergence test results show that there is persistent gap in regional real wage across Indonesia provinces. This reflects wage rigidity in which the law of one price does not apply. It also reflects heterogeneity in macroeconomic condition and labor market across provinces. However, by this far we do not know which components of macroeconomic and labor market conditions explain regional wage disparity across Indonesian provinces. Therefore, in the next section, we investigate the important factors that contribute to the persistent regional wage disparity. More specifically, we aim to provide empirical evidence to address the following question: what regional factors influence the formation of club convergence?

4.3. Factors influencing the club convergence

In this section we examine and discuss important conditioning factors that theoretically influence the club convergence formation. We consider the club convergence proposition that emphasizes initial condition as main factor responsible to club formation. In addition, we also include sectoral and labor market indicators that capture the role of structural characteristics towards club convergence as implied by classical convergence framework.

The ordered logit specification requires variable to be explained in an ordinal manner (McKelvey & Zavoina, 1975). Hence, we re-arrange the clubs by using the wage level of each club as reference to order the clubs from club 1, club 2 and club 3 as high, middle and low clubs, respectively. Finally, following previous literature, in the regression we use these ordered clubs

as dependent variable while our independent variables consist of main factors that theoretically influence club convergence. The detailed definition and sources of variables are in Table 3.

Table 3. Variables in ordered logit estimation

Variable	Definition	Source
Initial value of wage (2008)	Real wage in 2008 (in 000 IDR)	BPS
Manufacture employment share	$\frac{\text{Number of people employed in manufacturing sector}}{\text{Total number of people employed}}$	BPS
Investment share to GDP	$\frac{\text{Total investment}}{\text{Total GDP}}$	BPS
Labor force participation rate	$\frac{\text{Number of persons in the labor force}}{\text{Population aged ten (10) years and over}}$	BPS
GDP	Real GDP (2010 = 100) in log form	BPS

Note: BPS (Badan Pusat Statistik) is Indonesian Central Bureau of Statistics.

We report the results in Table 4. The ordered logit coefficient for each independent variable is displayed on the second column. However, the more useful results to evaluate the effect of a single variable on the probability of a province converging to a particular club are the marginal effects.⁴ The individual marginal effect measure how much the probability of a province included as a member of a specific club changes with respect to a small change in the explanatory variables. In this way, our results can explain how a unit change in independent variable affects probability a provinces clustered into club 2 (middle) and club 3 (low). However, our model can't precisely compute the marginal effects on probability to club 1 (high). We consider this as the problem of insufficient samples in club 1 (high). Nonetheless, the model sheds clear picture on how the selected factors influence the membership of club of convergence.

⁴ See Long & Long (1997) for a discussion on ordered logit models.

Table 4. The results from ordered logit estimation

Variables	Ordered logit coefficient	Marginal effects on probabilities		
		Club 1 (High)	Club 2 (Middle)	Club 3 (Low)
Initial value of wage (2008)	0.040** (0.017)	0.000 (0.000)	0.009** (0.004)	-0.009** (0.004)
Manufacture employment share	0.888** (0.409)	0.000 (0.000)	0.189** (0.106)	-0.189** (0.106)
Investment share to GDP	0.760** (0.363)	0.000 (0.000)	0.162** (0.078)	-0.162** (0.078)
Labor force participation rate	-0.214** (0.107)	-0.000 (0.000)	-0.046** (0.022)	0.046** (0.022)
GDP	1.137 (1.002)	0.000 (0.000)	0.242 (0.211)	-0.242 (0.211)
LR chi ²	42.29			
Prob (LR Stat)	0.00			
Pseudo R ²	0.73			
Number of provinces	34	3	9	22

Note: Numbers in parenthesis are the standard errors. ***, **, * show significant level at 1%, 5%, and 10%, respectively. Source: Authors' computation

All ordered logit coefficients clearly show the expected signs. The initial value of wage shows a positive effect for club 1 and club 2, which means the probability of province belonging to club 1 and club 2 is higher when the province had higher initial value of wage. Inversely, the negative effect for club 3 means that the province with higher initial value of wage has a small probability to belong in club 3. That also in line with the finding of Bartkowska & Riedl (2012), which shows that region's initial condition play a crucial role in Europe regions to determine which club their will belong.

Similar influence is also observed for manufacture employment share variable. That variable has a positive effect for club 1 and club 2, while it shows negative effect for club 3 which means the province with higher manufacture employment share has a higher wage than the rest. This result is also consistent with the finding of Felipe et al. (2019) where there is evidence that high-tech manufacturing firms generally pay higher wages in Indonesia. Furthermore, it also reveals that differences are likely due in part to differences in skill requirements of the sector, with average levels of education and training significantly higher. Moreover, high productivity rate in manufacturing sectors often become the main reason why labor in manufacturing sector often

earn higher wage than labor in other sectors. Strain (2019) finds evidence that there is a strong linkage between productivity and wages. In detail, he describes that when properly measured, productivity and compensations show a very similar trends in the last few decades.

Investment share to GDP also demonstrate similar effect with the previous variables mentioned before. Thus, it can be concluded that the higher private investment to GDP ratio will increases probability to be in higher wage clubs. It also means that higher demand of labor force amidst the relatively higher level of wage reflects regional imbalance in economic development where investment activities are largely concentrated in few provinces that have advantage in terms of better infrastructure, strategic geographical position, and natural resource endowment. For example, provinces like Jakarta, Banten, and Riau Island in club 1 which have better infrastructure condition rather than other provinces. These provinces also have strategic geographical location which surrounded by well managed transportation infrastructure, and thus will induce higher labor and capital mobility. This result also similar with the finding of Baskoro et al. (2019) which concludes that there is a possibility the positive sign of the wage variable concerning FDI explained by the higher productivity of labor, which represents an improvement of labor skill. Moreover, they also describe that the positive relationship of wage rate and FDI and the attractiveness of capital-intensive industries are in line with the shift of Indonesian industrial character.

On the other hand, labor force participation rate shows different result due to the negative sign in club 1 and club 2 while has positive sign in club 3. It means higher labor force participation rate decreases probability to be in higher wage clubs which reflects the standard labor supply and demand condition. Higher labor supply relative to its demand leads to downside pressure on wage. Similar to what is mentioned by Herr (2002), we find evidence of negative relationship between wage and labor supply. As for the last variable, GDP shows an insignificant role in explaining wage formation clubs. It implies that the size of economy is less important in explaining the regional difference in wage across Indonesian provinces.

In conclusion, the result from ordered logit model shows that the formation of club convergence in provincial wage is mostly explained by regional labor market condition. As we know from the result, the variables such as initial condition of wage, manufacture employment share, investment, and labor force participation can indeed explain to which club a region will belong while GDP insignificantly influence the club formation.

5. Conclusion

The study of convergence in regional wage has gained increasing attention in recent years in particular among regional scientists and policy makers. However, there is still few research aims to analyze the issue of wage convergence. The purpose of this paper is to empirically investigate the convergence of regional wage in Indonesia, a large and geographically diverse developing country. To achieve the goals, we divide our strategy into two main steps. First, using log t regression developed by Phillips & Sul (2007, 2009), we test whether regional wage converge to a common steady state. In the absence of overall convergence, we further check for the presence of club convergence. Second, we investigate important factors that influence the club convergence formation.

From the first step, our results show that there are three significant initial clubs which represent the convergence dynamics of regional wage across Indonesian provinces. There are 3 provinces clustered in club 1; 9 provinces in club 2; and 22 provinces in club 3. Overall, the results from our initial investigation implies that based on the long-run dynamics of regional real wage from 2008-2020 period, Indonesian provinces can be clustered into three club convergence.

In the second part, the result from ordered logit model shows that the formation of club convergence in provincial wage is mostly explained by regional labor market condition. The variables such as initial condition of wage, manufacture employment share, investment to GDP ratio, and labor force participation significantly influence the convergence club formation, while the role of GDP is insignificant. Finally, both findings of multiple club convergence and the influencing factors should aware the policy makers to manage regional wage condition through regional-based approaches. This is very crucial because it has been noticed that wage plays an important role in Indonesia's development plan and often become a push factor for capital and labor mobility.

