

# The Underlying Factors of Regional Income Disparities in Indonesia

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## The Underlying Factors of Regional Income Disparities in Indonesia

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### Abstract

An increasing of regional data availability has revived of scholars' interest in regional economic growth and disparities. The main reason for this revival came from attempts to improve the predictive ability of neoclassical model of growth. The objectives of this paper are to examine per capita gross regional product growth disparities, to check the existence of sigma and beta convergence across Indonesian provinces and to identify the underlying factors that affect per capita gross regional product growth. This is a quantitative study, and by making use of Coefficient of Variation and the Neoclassical Growth Model we found that The per capita gross regional product growth disparities tend to increase in the period of study, however, the existence of conditional beta convergence also implies. The underlying factors that are identified affect real per capita GRP growth are export, Foreign Direct Investment, Inflation and government expenditure.

**Keywords:** Gross regional product; Regional disparities; Convergence; Indonesia.



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### 1. Introduction

There are many studies on regional disparities in developing as well as developed ones. In Asian countries particularly, concern about regional economic disparities are becoming large in recent years. The remarkably economic growth in Asian countries, like China and India, had brought much benefit to those countries as a whole. On the other hand, however, this condition has caused an increase of the inequality across regions in those countries. During 1980-1990, Indonesian GDP accomplished 6.1 % growth per year and the next 8 years annual economic growth was 5.8 % per year. However, as in China and India (Fujita, 2001), regional economic disparities persist across Indonesian provinces.

In the most countries, high income regions usually undergo high cost of living (Rice and Venables, 2003). The mechanisms could be explained as follows: High income regions will attract people from low income regions. The increasing number of population in the high-income regions will increase the demand of daily life needs in these regions. Consequently, the demands will push cost of living up. As explained in the next section, recently several studies had been conducted in order to reveal to regional disparities and convergence across Indonesian provinces, however, most of them paid less attention to the importance of price disparity across regions in their analyses. By taking into account the price disparity across Indonesian provinces, this study is conducted in order to examine the regional real per capita income disparities and to check the existence of convergence across Indonesian provinces.

### 2. Literature Review

An increasing of regional data availability has revived of scholars' interest in regional economic growth and disparities. The main reason for this revival came from attempts to improve the predictive ability of neoclassical model of growth (Armstrong and J, 2000).

In the most of the developing countries, regional economic disparities are inevitable in the developing process. According to Rice and Venables (2003) persistent regional economic disparities are a feature of some, if not all, large countries. Regional economic disparities are common place and can appear remarkably large, even in geographically compact and high-income country. Armstrong and J (2000) argued that it is widely recognized that regional economic disparities in per capita income that persist for long periods of time have harmful effects on the efficient operation of the economy.

Regional income disparities across regions occur for some extent because of the different of per capita income growth. There are many factors behind the different in per capita income growth. Barro R. J. (1990) highlighted theories in which the initial values of human capital and per capita GRP matter for subsequent growth rates suggest relations with physical investment and fertility. In endogenous growth models, per capita growth and investment ratio tend to move together. While in the growth models with endogenous fertility, per capita growth and net fertility tend to move inversely. Armstrong and J (2000) noted the potential significance of export sector in explaining

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region's growth. Previously, Kaldor (1970) suggested that export is the engine of region growth, thus we can assume that export for some extent is one of the regional economic growth disparities source.

There are several literatures showed regional economic disparities and convergence across Indonesian regions in the various time periods, which employed various kinds of indices and per capita income definitions. For example, per capita GRP at current market price, showed that coefficient of variation (CV) from 1985-1996 for per capita GRP including mining, oil and gas sector was declining. In contrast, when they used per capita GRP excluding mining oil and gas sector, they showed CV was expanding. They argued that this is due to mining, oil and gas price fluctuation. (Resosudarmo, 2006) by using per capita GRP at current market price found that from 1993-2002 the CV stood at between 0.8-0.9 (Resosudarmo, 2006). They also employed panel data estimation to provincial current market price data such as ratio of gross fixed capital formation to GRP, FDI, government investment, investment in the secondary education as the proxy of human capital, inequality, trade openness, and role of oil and gas. They concluded that conditional convergence implied across Indonesian provinces in the period of study. Garcia (1998) employed real per capita GDP from 1975-1993 and found the existence of absolute beta convergence across Indonesian provinces. They also used some variable control in order to examine conditional convergence as follows: the average number of children born per woman between ages 15 and 49 as a proxy of total fertility, share of population over 10 years of age with junior and senior high school education and the number of students per teacher as proxies of educational attainment and the share of oil and gas as a proxy of natural endowment. They found that conditional beta convergence implies across Indonesian provinces (Garcia, 1998). Indonesian current market price household expenditures in 1987, 1990 and 1993, they applied their indices to decompose the inequality in the various variables such as rural and urban, provinces, age and education (Akita, 1988).

From other countries, Da Mata et al., tested the existence of beta conditional convergence and sigma convergence between the Northern and Southern regions as a group. The result showed the strongly suggested beta convergence between the Northern and Southern regions (Da et al., 2005). Moreover, the existence of sigma convergence was detected, by declining of standard deviation in Northern and Southern Region. While, Fujita (2001) by making use real per capita GRP, checked the existence of absolute beta convergence in China and found that at the national level, there is no evidence of convergence either in 1984-1994 or 1990-1994 period. However, after dividing China into 2 regions: Coastal and Interior and adding coastal dummy, they found the evidence of beta convergence of each period. Using weighted coefficient of variation (weighted CV), they also examined the existence of sigma convergence and found that there is a decrease in the coefficient during 1980s. However, the data in 1990s clearly showed the increase in sigma convergence. They noted that the decrease during 1980s could hardly be interpreted as evidence of a decrease in regional disparity between coastal and interior, since the decreasing weighted CV in this period is the catching up of several coastal provinces (Fujita, 2001).

### 3. Methodology

#### 3.1. Data

In this paper, we use the provincial level data as the unit analysis. The empirical analysis is based on cross section and Panel 1991-2016 years' data. The data are taken from The Indonesian Central Bureau of Statistics (Badan Pusat Statistik, BPS), and The Central Bank of Republic of Indonesia (Bank Indonesia, BI) databases.

The data of FDI, exchange rates and regional inflation rate are taken from Bank Indonesia and Statistic Indonesia databases. The reason of using 1991-2016 data, because of the completeness of data and as of this writing, 2016 is the latest year data that could be taken from BPS databases. In order to get the real value, GRP, government expenditure, FDI, export and domestic investment have been deflated by consumer price index (CPI) of each province.

Real per capita GRP excluding mining, oil and gas sector data for 1991-2004 are chosen since most of the value added in mining, oil and gas sector is not spilled over to the production regions but become the part of the central government revenue. we focus to the real per capita GRP excluding mining, oil and gas sector data since it will give more precise picture of Indonesian disparities for 1991-2004 analysis but we include them in 2014-2016 data since in this period, regions received sharing revenue from mining, oil and gas sector.

There are changes in the number of Indonesian provinces. Indonesia had 27 provinces, before East Timor received independence and became a new country in 1997. Subsequently, based on Law no.27 of 2000 Banten, Bangka-Belitung, and Gorontalo became independent provinces. The three provinces were formerly part of West Java, South Sumatera and North Sulawesi, respectively. Since 2002, North Maluku and Riau Island became new provinces, where formerly each one was a part of Maluku and Riau provinces, respectively. While West Papua based on Law no.45 of 1999 was created from the western part of Papua since February 2003. Since 2014, BPS collected data for 34 Provinces Thus we also make use the 2014-2016 data in the analysis.

#### 3.2. Model Specification

Barro and Sala-i-Martin formulate the empirical equation for estimating beta convergence (Barro R. J. X. S.-M., 2003) as follows:

$$(1/T) \cdot \log(y_{iT} / y_{i0}) = x - [(1 - e^{-\beta T}) / T] \cdot \log(y_{i0}) + [(1 - e^{-\beta T}) / T] \cdot \log(\hat{y}_i^*) + u_{i0,T} \quad (1)$$

where  $u_{i0,T}$  represents the effect of error terms,  $u_{it}$ , between dates 0 and T;  $\hat{y}_i^*$  is the steady state level of income; and  $x$  is the rate of technological progress, which is assumed same for all regions. Notice that in the equation

(1) includes  $[(1 - e^{-\beta T})/T] \cdot \log(\hat{y}_i^*)$  as explanatory variable which means per capita GRP growth rate depends on its initial level and its steady state level. This refers to conditional convergence concept.

In case of regional data as in this paper, instead of using multivariate equation (1) we can also estimate the univariate regression

$$(1/T) \cdot \log(y_{iT} / y_{i0}) = a - [(1 - e^{-\beta T})/T] \cdot \log(y_{i0}) + \omega_{i0,T} \quad (2)$$

Equation (2) refers to absolute convergence, since  $[(1 - e^{-\beta T})/T] \cdot \log(\hat{y}_i^*)$  is no longer an explanatory variable. Thus, the regions are assumed will converge to same steady state level of income. If  $[(1 - e^{-\beta T})/T]$  turns out to be negative, then the poor regions tend to grow faster than the rich ones. For conditional convergence (Equation 1), since we assume that regions have their own steady-state positions which could be different across regions, then we use some control variables as the proxies of the steady state level of income. Thus, we estimate the equation (2) in order to identify the existence of conditional convergence in the real per capita GRP growth rate across Indonesia provinces.

$$\Delta y_{it} = \alpha + b_1 y_{it} + b_2 X_{it} + b_3 \Delta X_{it} + b_4 edu_{it} + b_5 GE_{it} + b_6 rex_{it} + b_7 inf_{it} + b_8 FDI_{it} + b_9 DI_{it} + \varepsilon_{it} \quad (3)$$

where the subscript  $i$  refer to the provinces, while  $t$  refers to time.

- $\Delta y_{it}$  :  $(1/T) \cdot \log(y_{iT} / y_{i0})$ , Log real GRP per capita growth rate.
- $b_1$  :  $[(1 - e^{-\beta T})/T]$
- $y_{it}$  : Initial log real per capita GRP
- $X_{it}$  : Population
- $\Delta X_{it}$  : Population growth rate
- $edu_{it}$  : Education attainment
- $GE_{it}$  : Government expenditure
- $rex_{it}$  : Export
- $inf_{it}$  : Inflation rate
- $FDI_{it}$  : Foreign direct investment
- $DI_{it}$  : Domestic Investment
- $\varepsilon_{it}$  : Error term

Assuming diminishing marginal product of capital, the estimated coefficient of initial log per capita GRP ( $y_{it}$ ) is hypothesized to be negative (beta convergence). Population ( $X_{it}$ ) is hypothesized to affect economic growth positively through economies of scale. Population growth ( $\Delta X_{it}$ ) is the proxy for reproduction rate. High fertility implies an increase in the opportunity cost of economic activity, thus per capita income growth and net fertility tend to move inversely (Barro R. J., 1990; Barro R. J. X. S.-M., 2003).

On the basis of endogenous growth theory, human capital is an important factor to effect per capita growth. Due to nine year education mandatory in Indonesia, most variation among provinces involves senior high school. In this study we use the initial year of educational attainment as control variable. We define the variable educational attainment ( $Edu_{it}$ ) as the number of student enrolled in senior high school to the provincial population, since the school attainment data are not available. We use this variable as a proxy of human capital and hypothesized to affect per capita income growth positively.

Total consumption expenditure (private plus government expenditure) is identified as the one of the engine of per capita income growth in Indonesia (Nasution, 2002) and government expenditure can be used as a proxy of government policy as well (Barro R. J., 1990; Barro R. J. X. S.-M., 2003); thus government expenditure ( $GE_{it}$ ) is hypothesized to affect per capita income growth positively. Export ( $rex_{it}$ ) is the second larger contributor to aggregate demand in the Indonesia economy, thus export is hypothesized to affect economic growth positively.

Regional inflation rate ( $Inf_{it}$ ) reflects the variability of inflation across Indonesian Provinces. In the last decade Indonesia mostly underwent high rate of inflation. For example, based on the BI databases, in the crisis period 1997 and 1998 when the highest rate of inflation in the neighborhood Asian countries stood at 7.7 % (Thailand in 1997) and 10.7 (Thailand and Philippine in 1998), the inflation rate in Indonesia reached 11.05 % in 1997 and 77.63 % in 1998, respectively. In 2003, when inflation rate in Indonesia stood at 7.1 %, the highest rate of inflation in neighborhood Asian countries only stood at 4.5 % (South Korea). Inflation is considered hampering economic growth; thus, inflation is hypothesized to affect growth negatively.

Many studies showed that investment tends to increase growth. For example, (Barro R. J., 1990; 1991), (Barro R. J. X. S.-M., 2003) noted that per capita growth and investment tend to move together, therefore, foreign direct investment ( $FDI_{it}$ ) and domestic investment ( $DI_{it}$ ) are hypothesized to affect economic growth positively.

#### 4. Results and Findings

The importance of taking into account the price adjustment had been mentioned by Asra (1989). He argued that price adjustment will not only affect the magnitude but may also the trend of disparities have indicated by current price. Previously Esmara showed that in Indonesia the province with higher per capita GRP also had a higher living cost. By taking into account of provincial consumer price index (CPI) as price adjustment, we will get more precise pictures of disparities in Indonesia (Esmara, 1975).

First, we picture the Coefficient of Variation (CV) of per capita GRP in the current market price (Figure.1) and real price (Figure.2) in order to show the difference between them

Figure-1. Coefficient of Variation of Indonesian Provinces (in per capita GRP at current market price excluding mining, oil and gas)

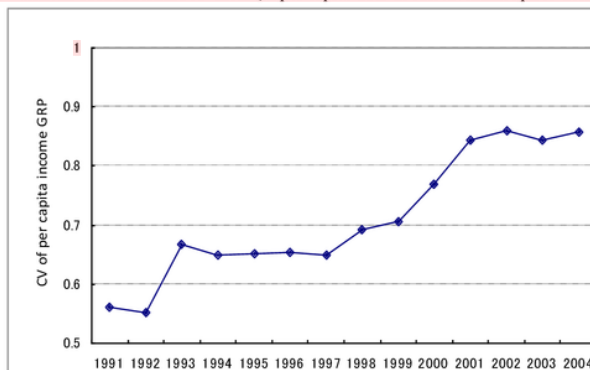
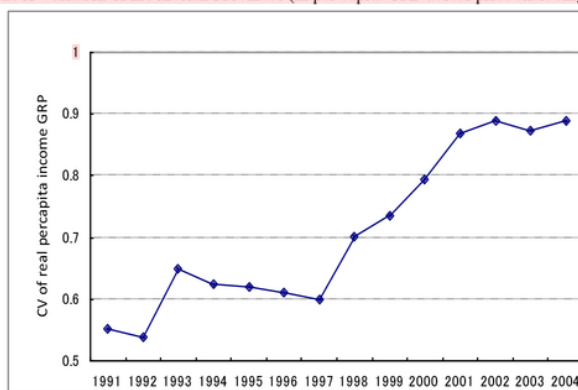


Figure-2. Coefficient of Variation of Indonesian Provinces (in per capita GRP at real price excluding mining, oil and gas)

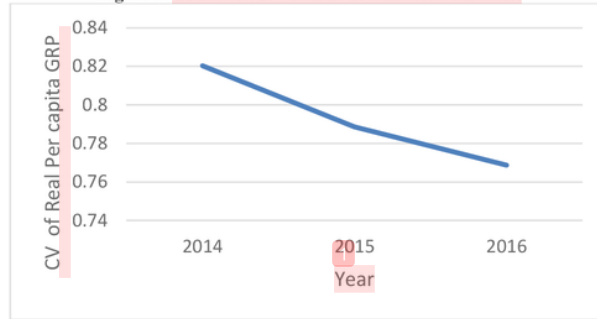


We find the different magnitude of CV in the most period of study and the trend is different in the period of 1994-1997. In this period CV of real per capita clearly show the decreasing trend while CV in the current price show the steady trend. As mentioned in the previous section (Resosudarmo, 2006) employed per capita GRP at current market price including mining, oil and gas sector, found that from 1993-2002 the magnitude of CV stood at between 0.8-0.9 in the period 1993-2002.

As shown by the figure 1, from 1991 to 2004 regional per capita GRP tends to disperse. There is slightly decreasing in 1991-1992 and 1993-1997, whereas since Indonesia was hit by financial crisis in 1997, regional economic disparities tend to increase and continue to 2004. Since when study about sigma convergence, we usually study about cross sectional dispersion of per capita income or earning levels by comparing the standard deviation, variance, or coefficient of variation across point in time (Fujita, 2001; Miller and Genc, 2005), thus CV could be seen a sigma convergence.

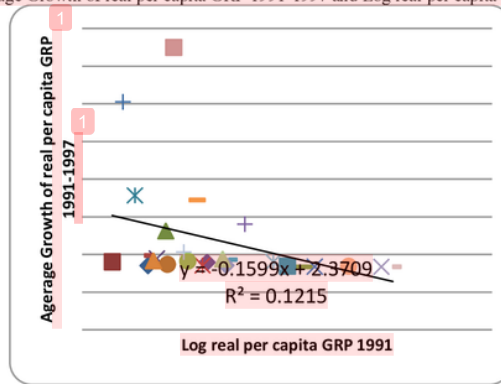
Figure 3, from 2014 to 2016 regional per capita GRP tends to converge, since the magnitude of CV tends to decrease.

Figure-3. Coefficient of Variation of Indonesian Provinces



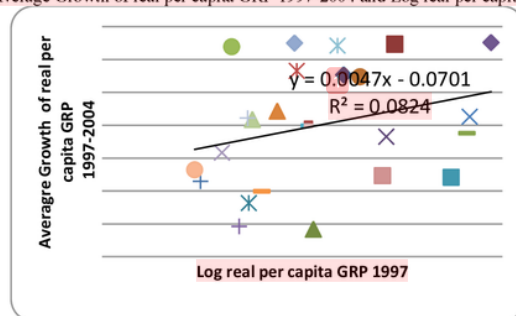
Since in the period of 1991-1997 CV tends to converge and in the period of 1997-2004 it shows the divergence trend, while in 2014 to 2016 CV reversely shows the convergence trend. Thus, we also examine the average growth of real per capita into these three periods. In the period of 1991-1997 we find the inversely trend which the lower real per capita GRP regions tend to growth faster than the higher ones (Figure 4). This trend indicates the existence of beta convergence.

Figure-4. Average Growth of real per capita GRP 1991-1997 and Log real per capita GRP in 1997



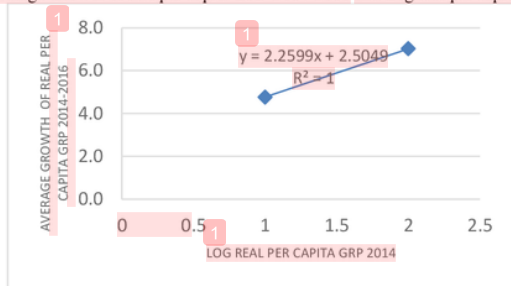
However, in financial crisis and after financial crisis period (1997-2004) CV tends to diverge (Figure.1 and Figure.2) and low per capita GRP regions tend to grow slower than the high per capita income regions (Figure.5). This trend indicates the existence of beta divergence.

Figure-5. Average Growth of real per capita GRP 1997-2004 and Log real per capita GRP in 1997



The trend shows in the figure 6 that the higher per capita income regions growth faster the lower per capita income regions. This is unique and interesting, because usually when the magnitudes of Coefficient of Variation tend to decrease (Figure.3). Based on Neoclassical growth theory and Theory of Convergence. The convergence happened when the average growth of lower income regions grows faster than higher income regions. In order to examine this result, we make use convergence model by Barro R. J. X. S.-M. (2003) to estimate the existence of convergence.

Figure-6. Average Growth of real per capita GRP 2014-2016 and Log real per capita GRP in 2014



Before discussing about the results, it is important to explain the reason of why we estimate both absolute beta convergence and conditional beta convergence. (Barro R. J. X. S.-M., 2003) and (De la fuente, 2000) argued that although absolute and conditional beta convergence are closely related, they have very different implication. Absolute convergence implies a tendency towards the equalization of per capita incomes within the sample. Thus, in the long run we can expect per capita income across regions will become similar, independently of its initial value. While conditional beta convergence implies in the long run each region will converges to its own steady state. Since the steady state can be different across regions, therefore the regional income per capita inequality can persist. Consequently, the rich regions can remain rich and the poor regions can remain poor (Barro R. J. X. S.-M., 2003; De la fuente, 2000).

Based on the growth equation in the section 3, we estimate the Indonesian provincial growth equation using OLS for the Indonesian cross-sectional 2014-2016 data. Table 1 reports the result of absolute convergence estimation across Indonesian provinces. The result show that coefficient of initial per capita GRP is positive but insignificant. This result can be interpreted that absolute beta convergence does not exist across Indonesian provinces. The finding is contrary to (Garcia, 1998) which found absolute beta convergence in the 1975 and 1993 period.

Table-1. Absolute convergence results for the period of 2014-2016

Variable	Estimated Coefficient	t- statistic
<i>Iy</i>	0.0220	0.7372
<i>C</i>	0.0642	0.3240
<i>NOB</i>	34	
R-sq	0.03	
Adj R-sq	-0.01	0.01

Note: \*, \*\*, \*\*\* : significant at the 10% , 5% , and 1 % level respectively.

Table-2. Conditional Convergence for the period of 2014-2016

Variable	Estimated Coefficient	t-statistic
<i>Iy</i>	- 0.1341***	-3.201
<i>X</i>	0.0003	1.101
$\Delta X$	1.1231	1.201
<i>Edu</i>	2.1091	1.261
<i>GE</i>	-0.4261**	-3.249
<i>Rex</i>	0.7018***	3.150
<i>Inf</i>	1.946	1.022
<i>FDI</i>	0.0356**	1.967
<i>DI</i>	0.0871	1.357
<i>C</i>	1.1239***	3.743
<i>NOB</i>	34	
R-sq	0.78	
Adj R-sq	0.63	

Note: \*, \*\*, \*\*\* : significant at the 10% , 5% , and 1 % level respectively

Table 2 reports the conditional convergence and the control variables as well as the underlying factors of real per capita GRP growth rate across Indonesian provinces.

Population is positive but insignificant in the estimation. Population growth rate coefficients have positive sign but insignificant. The similar results are shown by educational attainment and domestic investment. Those two variables are positive but insignificant in the estimation.

Initial real per capita GRP is negative and significant at the 1 % level in the estimation. It indicates that conditional beta convergence exists both across Indonesian provinces. The existence of conditional beta convergence implies that each Indonesian province will converge to its own steady state, instead of to the same steady state as predicts by absolute convergence.

The result of increasing sigma convergence (Figure. 1) and the existence of conditional beta convergence (Table 2) support (Barro R. J. X. S.-M., 2003; Sala-i-Martin, 1996) explanation about relationship between sigma and beta convergence. They mentioned that sigma convergence can disperse even if beta convergence implies, since beta convergence is necessary condition but not sufficient condition for sigma convergence.

Exports have positive sign as expected and significant at the 5 % level. We use 2SLS for real per capita growth rate in order to avoid the potential endogeneity problem and to seek the positive impact of investment variables (Brun and Combes, 2002). The instruments are government expenditure, *FDI*, and domestic investment. Exogenous variables are initial per capita GRP, population, population growth rate, educational attainment, inflation, dummy variables and constant, as well. When we use 2SLS, the variables such as government expenditure turn out to be negative and significant at the 5% level. This result is similar with (Barro R. J., 1990;1991) and (Barro R. J. X. S.-M., 2003) who found the negative relationship between government expenditure and per capita income growth. We also find that *FDI* turn out to be positive and significant at 5% level, as expected.

We have tried to include inflation in the endogenous variable in order to capture its negative impact to regional growth. However, even after using the variation combinations of non-lag, lagged 1 of the variables such as inflation, government expenditure, *FDI* and domestic investment, the coefficients of inflation rate are still positive and significant at the 5 % level in the estimation with Barro R. J. X. S.-M. (2003) also found the positive sign of inflation when they estimated cross country regression in the period of 1965-1975.

A possible interpretation for the positive and significant result of inflation is as follow. Consumption expenditure had been becoming main source of regional per capita growth. (Nasution, 2002) noted consumption expenditure had been growing again since 1999, and in 2001 total consumption expenditure amounted to about 60% of GDP. However, an increasing of the consumption expenditure is not without consequence. This factor for some extent had caused the increasing of inflation. When inflation increases because of the increasing of the consumption expenditure, it moved together with per capita income growth. Therefore, inflation shows the positive impact to income per capita growth.

## 5. Conclusion

We find that although absolute beta convergence does not exist, however, conditional convergence exists across Indonesian provinces. It means that each province will converge to their own steady state value, instead of to the same steady state as predicts by absolute convergence.

The underlying factors that are identified as positively affect real per capita GRP growth in this study are export, inflation, and *FDI*. While, the underlying factors that negatively affect real per capita GRP growth is government expenditure.

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