Marine capture fisheries production and intensity of rainfall: An application of autoregressive distributed lag (ARDL) model

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Marine Capture Fisheries Production and Intensity of Rainfall: An Application of Autoregressive Distributed Lag (ARDL) Model

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Abstract. Indonesia is a maritime country that has a high production of fish. West Java is one of the provinces which accounted for a high fish production in Indonesia with total production is 8,316,607.377 tons in 2011. The fish production in West Java has a trend and seasonal components. The trend and seasonal components is influenced by climate change. One of interesting indicator of the climate change is the change in intensity of rainfall. The increasing intensity of rainfall would be increase fish production. The influence rainfall on fishing production can be formulated in a mathematical model using Autoregressive Distributed Lag Modeling (ARDL). This method was applied because of the impact of the lag of independent variables and dependent variable that included in the model. The model informs how big the impact. The parameter estimation was conducted using ordinary least squares (OLS) and obtained adjusted $R^2 = 0.8265$. The high fish productions in the previous period affect the decline in fish production in the next period.

Keywords: capture fisheries, rainfall, autoregressive distributed lag modelling, ARDL, ordinary least square, OLS.

INTRODUCTION

Indonesia is a maritime country that has a high fisheries production. Results of capture fisheries production is growing approximately 25% in nine years between 2000-2008 (Ministry of Marine Affairs and Fisheries, 2013). West Java is one of the provinces which accounted for a high fish production in Indonesia. The number of fish caught in West Java province in 2011 occupied the first position as many as 8,316,607.377 tons, followed by the province of North Sumatra and Southeast Sulawesi with the value of each 8,081,467.389 tons, and 7,218,729.880 tons (Ministry of Marine Affairs and Fisheries, 2014).

The fish production at this time suspected to be influenced by the outcome of the fish production in the past. If there is overfishing in the previous fishing, it will affect the results of fishing at this time. This is related to fish stocks in the sea. The same thing happens to rainfall. Changes in rainfall intensity would lead to changes in ocean circulation (Grafton, 2009). Rain will also cause the fish rise to the surface of the water so that it will increase production of fishing. This is what underlies the suspicion of past state influence of variables on the current state. The influence rainfall on fishing production can be formulated in a mathematical model using Autoregressive Distributed Lag Modeling (ARDL). This method was applied because of the impact of the lag of independent variables and dependent variable that included in the model. The model informs how big the impact.

The results of the fish production forecasts are useful for Department of Marine Affairs and Fisheries like when preparing the Medium Term Objectives and Targets. One of the goals of the Department of Marine Affairs and Fisheries is to increase the production of fish so that it takes the right forecast value to set a production target, so this goal can be achieved. In addition, the forecast value can also be used to create appropriate policies in order to achieve one of the objectives of the Department of Marine Affairs and Fisheries, which is to increase the quantity of production of fish (Department of Marine Affairs and Fisheries of West Java Province, 2015)

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