Response to Reviewer Comments

Point 1: The paper is very interesting and can be improved if it estimates the coefficients for explanatory variables in Step 1 to obtain a homogenous measures of the variables (the coefficients) that will not reach the goal of calculating the labour productivity that should be conducted in a Step2 by plugging the coefficients mentioned above in the input terms in the equation.

Response 1: Thank you for your comments. In this paper, we use Lucas (1988) production function and treat education time as exogenous (Mankiw *et al.*, 1992)[1], and we specify the production function as follows:

$$Y = AK^{\beta}(uH)^{1-\beta} \tag{1}$$

where K is aggregate capital, H is human capital, β is the output elasticity of physical capital, u is education time (total time volume is normalized to 1), and A represents the technical level.

In fact, this function was put forward by Cobb-Douglas in 1928, and developed by Lucas in 1988. Cobb-Douglas equation is a very classical production function, but it also has some weaknesses. For example, this equation attaches great importance to the role of capital, but ignores the role of technology, assuming that technology is invariable. Solow (1956, 1957) improved the Cobb Douglas' production function model in 1956, deduced the growth rate equation under the assumption of technological neutrality, and separated the contribution of technological progress to economic growth. Elsadig (2006) developed the production function by Solow (1956, 1957), and Elsadig (2011) used this developed function to measure the effects of labour productivity.

This paper attaches great importance to the role of human capital, so we use Lucas (1988) production function. Perhaps in the future research, we will use the production function developed by Solow (1956, 1957) and Elsadig (2006) to measure the labour productivity and other productivity.

Point 2: The results generated by the paper most likely are not valid as the estimated the data is in the level and didn't test the stationarity of the data through unit roots test and cointegration.

Response 2: This paper mainly wants to investigate the relationship between leisure and labor productivity, and we use panel regression method to analyse the impact of leisure time on labor productivity at the national level. The regression analyses are

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[1] By treating human capital as an endogenous variable (Lucas, 1988), we can measure an endogenous accumulating path of human capital. This treatment does not affect the main conclusion about the optimal path of labor productivity in our study. For simplicity, we do not pursue this issue here.

conducted using the panel-corrected standard error (PCSE) estimates, and we think the method is valid in this paper.

In order to rule out the heteroscedasticity problem, we adopt the natural logarithm from the all variables corresponding to the data, so we didn't test the stationarity of the data through unit roots test and cointegration. But we think the results generated by the paper are valid.

Perhaps in the future research, we can use dynamic panel regression to investigate more accurately the impact of leisure time on labor productivity, and we will test the stationarity of the data through unit roots test and cointegration.