

# Modeling TFP Growth with an Augmented Solow Residual Growth Model

Using Human Capital Measures in Worldwide Panel Data

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	(1)	(2)	(3)
VARIABLES	fe-model1	fe-model2	fe-model3
loghc	0.0234*** (0.00611)	0.0216* (0.0111)	0.0216* (0.0111)
hcratio	-0.0506*** (0.00656)	-0.0393*** (0.00652)	
L.growththfp	0.0264 (0.0163)	0.0192 (0.0161)	0.0192 (0.0161)
1965.year		-0.00626 (0.00441)	-0.00626 (0.00441)
1970.year		-0.00511 (0.00434)	-0.00511 (0.00434)
1975.year		-0.0148*** (0.00448)	-0.0148*** (0.00448)
1980.year		-0.0303*** (0.00463)	-0.0303*** (0.00463)
1985.year		-0.0133*** (0.00484)	-0.0133*** (0.00484)
1990.year		-0.0175*** (0.00519)	-0.0175*** (0.00519)
1995.year		-0.0105* (0.00553)	-0.0105* (0.00553)
2000.year		-0.00139 (0.00584)	-0.00139 (0.00584)
2005.year		-0.0117* (0.00619)	-0.0117* (0.00619)
2010.year		-0.0103 (0.00650)	-0.0103 (0.00650)
2015.year		-0.0192*** (0.00682)	-0.0192*** (0.00682)
c.ctfp#c.loghc			-0.0393*** (0.00652)
Constant	0.0145*** (0.00357)	0.0217*** (0.00595)	0.0217*** (0.00595)
Observations	1,150	1,150	1,150
R-squared	0.061	0.154	0.154
Number of Countries	118	118	118
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

## Goal

- This paper studies the effects of human capital on the growth rate of total factor productivity using worldwide panel data from 1950-2019. The metric of human capital used is a combined metric using both the quantity and quality of education in a country.

What is “human capital”?

- Human capital is the measurement of the relative skills and knowledge of the individual, group, or population.

## Hypotheses

- $H_0$ : Human capital is statistically significant and has a positive effect on total factor productivity growth.
- $H_1$ : Human capital is a positive facilitator of technology diffusion.
- $H_2$ : There will be a convergence of growth rates in the model.

How is human capital measured for every country

- Quantity
  - Evaluated through looking at the average years of schooling of the relative population
- Quality
  - Uses international test scores
- Combined
  - Combines both the quantity and quality metrics into a single internationally-comparable index

## Results

- As shown in column (1), an increase of 10% would increase TFP growth by 0.234%. When the developing nation is very far away from the TFP level of the leader country (ctfp almost 0.0), the contribution of a 10% increase human capital to TFP growth could be upwards of 0.45%. Therefore, the model predicts that a 10% increase in human capital over the 5-year period could increase the annual average TFP growth rate by 0.234% to 0.45%.

What is Total Factor Productivity (TFP)?

- TFP can be defined as productivity growth resulting from changes in technology, i.e., productivity growth due to technological progress and innovation
- Synonymously known as technological progress

My econometric paper studied the effects of education, through “human capital”, on the technological progress of a country. Further, I examined whether the Neoclassical idea of “conditional convergence” is present with TFP growth rates.