Income ranking and convergence with physical and human capital and income inequality

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Abstract

This paper presents an overlapping generations model with physical and human capital and income inequality. It shows that inequality impedes output growth by directly harming capital accumulation and indirectly raising the ratio of physical to human capital. The convergence speed of output growth equals the lower of the convergence speeds of the relative capital ratio and inequality, and varies with initial states. Among economies with the same balanced growth rate but different initial income levels, the ranking of income can switch in favor of those starting from low inequality and a low ratio of physical to human capital, particularly if the growth rate converges slowly.
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1. Introduction

This paper presents an overlapping generations model with income inequality originating from innate ability, and endogenous accumulations of physical and human capital, in the presence of spillovers from average human capital. It focuses on three related questions. First, how does growth interact with income inequality when investments in physical and human capital are endogenously chosen? Second, how does the economy converge when income inequality adjusts in one dimension and the ratio of physical to human capital adjusts in another? Third, and foremost, can catching-up and even overtaking in income ranking

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occur among economies sharing the same balanced growth rate but starting from different levels of per capita income?

With the two-dimensional adjustment mechanism, our model sheds light on these questions as follows. Due to the spillovers from average human capital, the earnings of children increase with the earnings of their parents at a diminishing rate within families, and regress to the intragenerational mean value of earnings over time. Thus, income inequality converges to its long-run level. If inequality is initially high, then the growth rates of average human capital and average output are initially low, given an increasing and concave function describing the education technology. The resulting high ratio of physical to human capital further impedes output growth under the standard assumption of diminishing marginal products. Moreover, the increased ratio of physical to human capital tends to raise the wage rate per unit of effective labor but lower the interest rate, thereby tending to accelerate growth in average human capital relative to growth in average physical capital in transition. Eventually, the ratio of physical to human capital converges to its long-run level.

The speeds at which income inequality and the ratio of physical to human capital converge differ from each other in general in this model. Along the balanced path, the lower of the two speeds sets the convergence speed for the growth rate of output per capita. Outside the balanced path, the convergence speed of the growth rate varies over time, depending on the gap between initial and steady states in terms of income inequality and the ratio of physical to human capital.

If initial inequality and the initial ratio of physical to human capital are all conducive to (harmful for) economic growth, they reinforce each other for an extra push (drag) compared to cases without inequality or without an adjustable ratio of physical to human capital. The high (low) growth rate can remain above (below) normal for generations, particularly when the growth rate converges slowly. Consequently, the ranking of income levels per capita can change among economies sharing the same balanced growth rate but having different initial states, in favor of those starting with low inequality and a low ratio of physical to human capital.

This paper differs from the existing literature on capital accumulation and income distribution in some important ways. The existing models typically describe their dynamics by a one-dimensional locus, without the joint evolution of income inequality and the ratio of physical to human capital that we consider here. For example, many of them focus on capital accumulation, and bypass the issue of income inequality by assuming representative agents (e.g. Lucas, 1988). Those that also consider the interaction between growth and income inequality assume either one type of capital or a constant ratio of one type of capital to another (e.g. Tamura, 1991; Glomm and Ravikumar, 1992; Eckstein and Zilcha, 1994; Persson and Tabellini, 1994; Benabou, 1996; Zhang, 1996). These extended models usually find a negative effect of income inequality on output growth as in our model. But unlike our model, they could not capture the indirect negative effect of income inequality on output growth via raising the ratio of physical to human capital.

Also, the convergence speed of the growth rate in the existing studies with a one-dimensional adjustment mechanism is constant (e.g. Barro and Sala-i-Martin, 1992; Ortigueira and Santos, 1997). However, the empirically estimated convergence speed of the growth rate of per capita GDP varies across samples for different times or different