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Inequality and growth: the dual role of human capital in development

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Abstract

To examine how human capital accumulation influences both economic growth and income inequality, we carefully endogenize the demand and supply of skills. We explicitly introduce the costs and externalities in education, and examine how both relate to learning-by-doing and R&D intensity. In addition, we endogenize the determinants of the skill-bias of labor demand: the complementarity between technology and skilled and unskilled labor. Our results identify parameters that are central to the evolution of inequality during the development process. We characterise development thresholds when countries switch endogenously from pure learning to deliberate R&D, and we show that technical change can generate multiple steady states that are consistent with the cross-country data on inequality and skill-premia. © 2001 Elsevier Science B.V. All rights reserved.

1. Introduction

The relationship between equality and growth is of fundamental interest not only to economists, but also to policymakers. Despite the fact that the empirical

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literature on the subject dates back to Kuznets (1955), no definitive stylized facts have emerged that indicate how inequality and growth interact during the development process.[1] This lack of a clear relation between inequality and growth may be partly due to the dual role of human capital in development. In his analysis of the relationship between human capital and inequality, Tinbergen (1975) suggested that inequality is ultimately determined by the opposing effects that technology and education exert, respectively, on the demand for and supply of skilled labor, and hence on the relative wage. He stipulated that the relationship between growth and inequality is determined by the "race between technological development and education" (1975, p. 97). Tinbergen's statement has not been formalized and the task of this paper is to model both effects explicitly to shed light on the remarkably diverse empirical relationship between human capital and inequality.

In this paper, we explicitly model endogenous human capital and technology to highlight that the relationship between growth and inequality is indeed complex due to offsetting supply and demand effects. In our model, the direct effect of greater supplies of human capital is to lower the relative wage, and hence, inequality. However, we also highlight that human capital accumulation indirectly generates more innovations, which in turn increase the demand for skilled workers to absorb new technologies into production. As a result, our model predicts a non-monotonic relationship between educational attainment and inequality, which may help to explain why cross-country analyses of income inequality tend to find that school enrollment rates have little explanatory power.[2]

In modeling human capital accumulation and technical change, we focus on three essential features. First, we explicitly introduce costs and externalities associated with skilled labor supply, and examine how both relate to learning-by-doing and R&D intensity.[3] Second, we endogenize the determinants of the degree of skill-bias in labor demand. Specifically, we endogenize the complementarity between technology, and skilled and unskilled labor. Third, we differentiate between deliberate R&D and serendipitous learning-by-doing. R&D is potentially the more productive means of innovation, but it is also more costly and it requires an adequate number of researchers to yield sufficient returns and justify R&D investment. As a result, the model determines endogenously which countries rely

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[1] Cross-country evidence on the effect of growth on inequality and on that of inequality on growth is inconclusive (see, for example, Anand and Kanbur, 1993a; Deininger and Squire, 1998; Forbes, 2000), while historical and recent time series shows a diversity of experiences (Williamson, 1991, 1999; Gottschalk and Smeeding, 1997). For a review see, Aghion et al., (1999).

[2] See Bourguignon and Morrisson (1998, Table 3) and Breen and García-Peñalosa (2000).

[3] Rather than focusing on parental effects in education (as Galor and Tsiddon, 1996, for example), we are concerned with group externalities in education, following the growing literature on external effects within schools and the role of "social capital" in human capital accumulation. See Tamura (1991, 1996), Galor and Moav (2000b) and Benabou (1996a,b, 2000) for models with externalities at the school level, and Borjas (1995) for related evidence.