



Migration and dynamics: How a leakage of human capital lubricates the engine of economic growth

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ABSTRACT

This paper studies the growth dynamics of a developing country under migration. Assuming that human capital formation is subject to a strong enough, positive intertemporal externality, the prospect of migration will increase growth in the home country in the long run. If the external effect is less strong, there exists at least a level effect on the stock of human capital in the home country. In either case, the home country experiences a welfare gain, provided that migration is sufficiently restrictive. These results, obtained in a dynamic general equilibrium setting, extend and strengthen the results of Stark and Wang (2002) obtained in the context of a static model.

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1. Introduction

In an earlier paper, Stark and Wang (2002) presented a new paradigm in the study of the effects of the migration of skilled workers. Stark and Wang (2002) argued that the prospect of migration from a developing country to a developed, technologically advanced country changes not only the set of opportunities that individuals in the developing country face, but also the structure of the incentives that they confront: higher prospective returns to human capital in the developed country induce more human capital formation in the developing country. In particular, they showed that an improvement in the incentives that govern the decision to acquire human capital can lead not only to an increase in the human capital that individuals choose to form but also, under certain conditions, to a welfare gain for all, migrants and non-migrants alike. However, the static framework employed in Stark and Wang (2002) fell short of informing us whether the human capital gain can be the harbinger of long-term economic growth. This is the subject of the present paper.

We develop an overlapping-generations growth model and investigate the associated dynamic general equilibrium. We proceed in four steps. First, we derive the long-run steady state in a small open economy with free international capital flows, but without the possibility of migration. We show that this steady state is characterized by a constant level of human capital and a constant growth rate of output which, in turn, is equal to the exogenous growth rate of the population.

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Second, we study growth dynamics when the individuals in the home country face a strictly positive probability of migrating to a destination country where the returns to their human capital are higher than at home. The higher expected wage rate yielded by the prospect of migration induces the individuals to acquire more human capital. In our model, human capital formation is subject to a positive intertemporal externality beyond some threshold level. We show that the size of the spillover effect of the current human capital on future productivity plays an important role in determining the long-run growth effect of the prospect of migration. When the spillover effect is sufficiently strong, the prospect of migration results in a higher growth rate of the home country in the long run; however, a weak enough, or a complete absence of, a spillover effect will lead to only a level increase in human capital, with a reduction of the growth rate in the long run.¹

Third, we conduct a welfare analysis, looking at the wellbeing of the individuals who stay behind in the home country. When the workforce is homogeneous, these individuals too have responded (ex ante) to the migration-conferred incentive to acquire more human capital, yet ended up (ex post) not subjecting their improved human capital to the higher pay environment abroad. Provided that migration is restricted, the long-run growth gain translates into a welfare gain. Moreover, even if there is no long-run growth gain, a welfare gain is still possible under restrictive migration policies, just as originally demonstrated in Stark and Wang (2002) in the context of a static model.

Finally, in step four we demonstrate that our findings are robust to the introduction of heterogeneity of skill levels. Specifically, we assume that individuals may differ in their ability to form human capital, and that only the highly skilled individuals, who in equilibrium acquire more human capital than the low-skill individuals, face a prospect of migration. Despite the negative effect caused by the migration of such individuals, a growth gain as well as a resulting welfare gain in the home country can still materialize.

2. Human capital formation and economic growth: the (benchmark) economy without migration

Consider a small open economy without migration. The economy consists of overlapping-generations, with each generation consisting, in turn, of homogenous individuals whose lives can be divided into two periods. The population grows at a (gross) rate $n > 0$. Each member of each generation acquires human capital in the first period of his life (“youth”). In the second period of his life (“old age”) the member works, repays the loan that he took to finance the human capital investment, procreates (at the rate n), and consumes.

More specifically, in each period a young individual undertakes educational investment which is financed by borrowing from a perfect capital market, where the prevailing world (gross) interest rate is $R > 0$. An old individual works, supplying inelastically the human capital which he acquired during his youth. Let e_t be the amount of educational investment, financed by borrowing, of a young individual in period t , and let h_{t+1} be the resulting level of human capital available to the individual in the subsequent period $t + 1$. We assume that the production function of human capital is a product of two terms: the young individual's own educational investment, and the human capital level of the old (parent) generation. Because within a given generation individuals are identical,² the prevailing average level of human capital is the same as an old individual's level of human capital. Formally, we assume that

$$h_{t+1} = e_t^\alpha h_t^\beta, \quad (1)$$

where α and β are positive parameters satisfying $\alpha + \beta < 1$ (that is, the production function of human capital exhibits decreasing returns to scale). The incorporation of h_t in (1) emanates from the assumption that the prevailing (average) level of human capital creates an environment that facilitates human capital formation for any given level of educational investment. The prevailing level of human capital thus acts as a contemporaneous pulling up externality.³

The output produced in the economy in period t , Y_t , is given by

$$Y_t = A_t H_t, \quad (2)$$

where H_t is the aggregate human capital in the economy (the sum of the levels of human capital of all the old individuals), and where A_t is a productivity factor. We assume that the productivity factor is subject to a threshold externality in the spirit of Azariadis and Drazen (1990), that is,

$$A_t = f(h_{t-1}), \quad (3)$$

¹ The idea that migration might lead to higher growth through some sort of an intertemporal spillover effect on productivity has been suggested, but not explicitly studied, by Mountford (1997). It is noteworthy that in contrast to Mountford (1997), who focuses on the possibility of migration resulting in some long-run level effects on human capital accumulation and on output for the home country, we study in the present paper the long-run growth as well as welfare effects of migration. Stark, Helmenstein, and Prskawetz (1998) have also referred to the positive externalities that the probability of migration could confer upon the home country.

² The case of heterogeneous individuals is studied in Section 5.

³ Similar production functions of human capital are quite standard in the relevant literature. See, for example, Lucas (1988), Galor and Stark (1994), and Glomm and Ravikumar (2001). The restriction $\alpha + \beta < 1$ is helpful in obtaining a steady state for the human capital dynamics.

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